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Water and Sewage Chemistry and Chemicals

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- Acids and Bases

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Every City Official, Engineer and Plant and Factory superintendent had better be ready and willing to go along in a lot of new changes for the active days of post-war. Your America is going to be a pretty alive and progressive country. Things are going to happen very rapidly.

There is one mighty big and important fact that all should remember: . . . all progress, growth and development will absolutely depend upon an adequate and thoroughly dependable supply of water.

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WELL WATER SYSTEMS DEEP WELL PUMPS

WAR and POSTWAR EMERGENCIES



Providing Funds for Postwar Work

West Palm Beach, Florida, has voted (nearly 2 to 1) to levy a tax on sales by the local electricity, gas, water and telephone services to finance a postwar program calling for an expenditure of \$1,688,000. The tax will be added by the utilities to their monthly bills and they will be responsible for turning the amounts so collected over to the city treasury. The tax is 10% on a monthly bill up to \$25, 5% for the next \$50 and 1% for all over \$75. The projects so financed include prevention of lake pollution, reconstruction of sewers and incinerators, repairs to streets and seawalls, and replacing of equipment for fire, police, health and public works departments.

Portland, Oregon, citizens have voted bond issues and a special tax levy to provide \$24,000,000 for postwar public work, which includes \$12,000,000 for a sewage treatment plant and sewers, \$3,000,000 for harbor and dock facilities, \$4,000,000 for road improvements and \$5,000,000 for school buildings and equipment.

Purchasing Surplus War Property

It is probable that little highway or other construction machinery that has been or will be sent to any of the war fronts will be returned to this country. That which is not worn out or destroyed probably will be needed there for restoration of war-damaged roads, bridges and other structures. But United States manufacturers have so increased their capacity for producing such machinery that it is believed there will be little delay in providing all that will be needed for postwar work, little or no conversion of plant being necessary since the equipment turned out in wartime production has been chiefly standard peacetime models. So, with that now in this country and being released by WPB for civilian use here, any delay in starting postwar work is more likely to be due to delay in completing plans than to lack of equipment.

Under recently-issued instructions, before used construction equipment is offered for sale to the general public, it will be first offered to federal agencies and next to tax-supported agencies. The Treasury regulation then specifies that before offering any construction machinery to states, their political subdivisions and other tax-supported agencies, the Public Roads Administration should be consulted as to the actual and relative needs of such agencies. To the extent practicable, negotiated sales would be based on the recommendations of the Public Roads Administration. After used construction equipment has been offered to federal and state agencies, it will then be offered to regularly established equipment dealers. If no purchasers are found for the equipment under this procedure the property will then be offered to the general public.

The United States Conference of Mayors reports that officials of several cities have been approached by individuals seeking to be put on a retainer basis with the city

for the purpose of facilitating purchase of surplus war property, but that this would be a waste of the taxpayers' money. Some years ago, in connection with the PWA program, Secretary Ickes, Administrator of Public Works, forced most of these so-called "fixers" out of business but apparently they are endeavoring to operate again. The duly-constituted officials of cities are perfectly competent to carry on necessary surplus property negotiations with all Federal Disposal Agencies.

Central Bureau for Construction Contractors

A new central bureau known as the Construction Bureau has been set up by the WPB to help promote postwar construction work. It replaces the divisions of construction machinery, building materials and the various divisions of the Facilities Bureau. Contractors will, as they have in the past, apply to that WPB operating bureau which has jurisdiction over their particular field, but need not deal with separate divisions.

Priority on Cast Iron Pipe

Water works and gas plants may now purchase up to \$10,000 worth of cast iron pipe (former limit, \$1,500) without obtaining permission of WPB provided (1) No facility or part which is serviceable in its existing installation may be replaced except to avoid imminent breakdown. (2) Design emphasizes economy of manpower and material and substitution of more plentiful for scarce material. (3) New facilities are necessary for rendering service at minimum standards. (4) No extension of a line to consumer's premises may be made or connected by a producer unless it is authorized by a Supplementary U-1 Order, or by the approval of an application filed on Form WPB-2774. In an emergency, approval may be obtained by telephone or telegraph, confirmation to be obtained by application on Form WPB-2774.

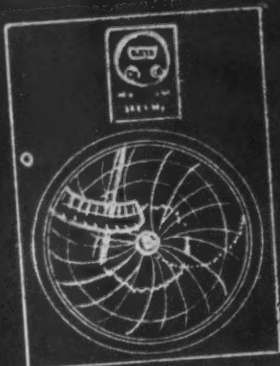
If a job can be classified as "maintenance" or "repair," there is no limit to the amount of pipe that may be purchased provided it meets conditions 1 and 2 above and it is necessary to maintain or restore service as minimum standards, or to prevent damage to facilities from overload, deterioration, storm or flood, climate, soil conditions or similar contingencies.

The A. P. W. A. Favors Federal Airport Construction Program

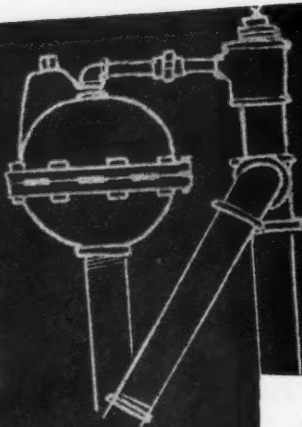
The recent Congress of the American Public Works Association adopted resolutions favoring "a comprehensive federal airport construction program along the general lines suggested by the Civil Aeronautics Administration," but opposing acceptance of federal or state aid by municipalities "conditioned upon relinquishment of proper control by such municipalities." It favored, however, "the continuance by the Civil Aeronautics Adminis-

(Continued on page 54)

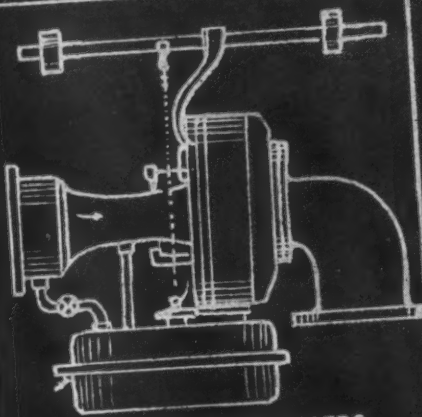
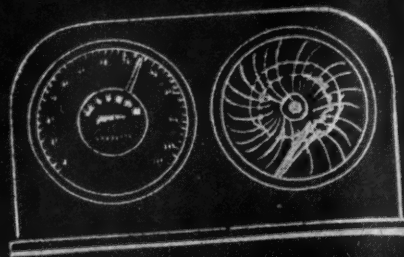




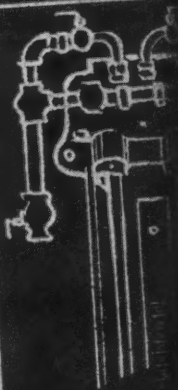
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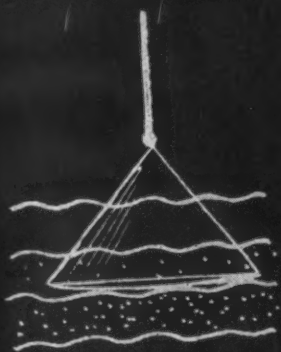
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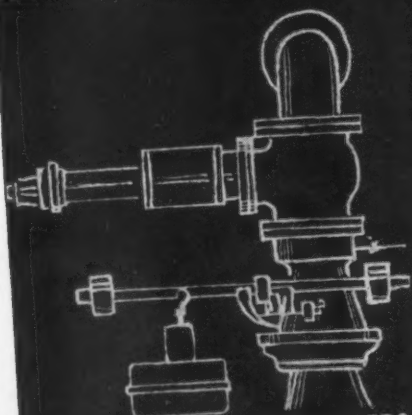
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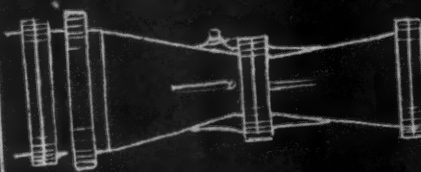
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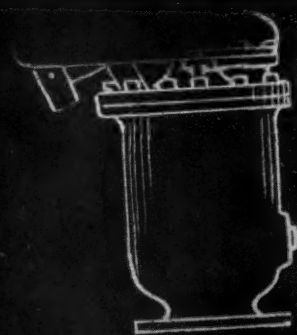
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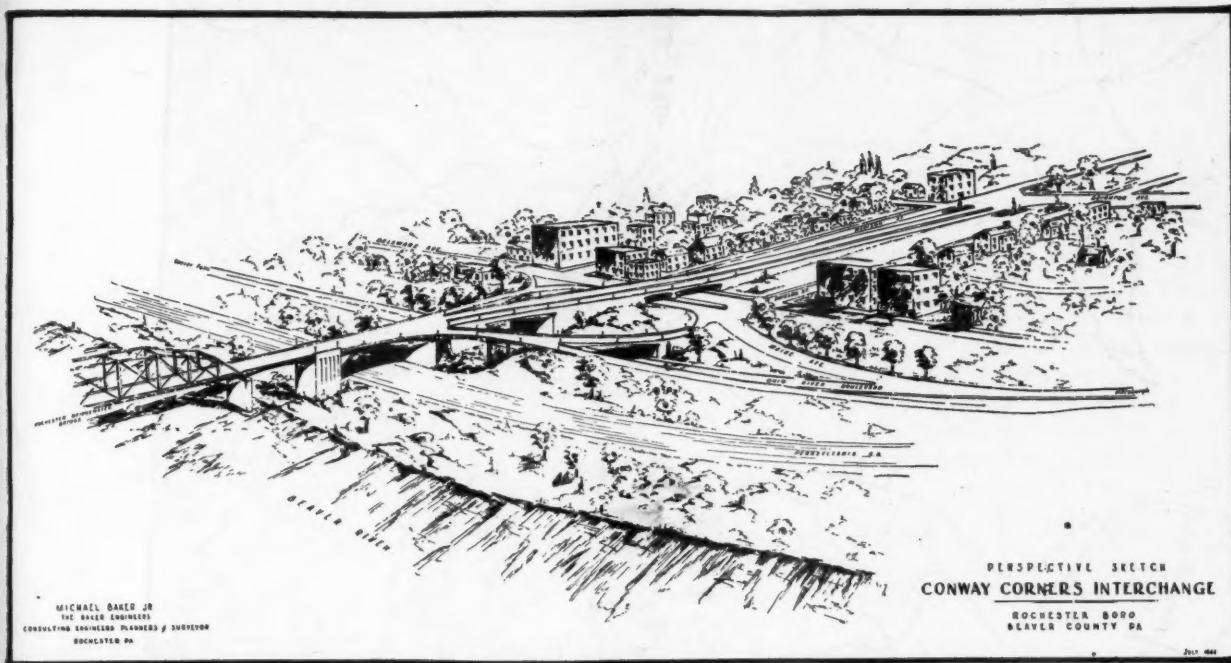
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Proposed plan for solving the intersection problem at Conway Corners, the worst bottleneck in the county.

A \$63,000,000 Highway Program for Beaver County, Pa.

Included in a master plan that totals over one hundred million dollars and is based upon a study of the physical, sociological and economic make-up of the county. How a five-year plan can be financed.

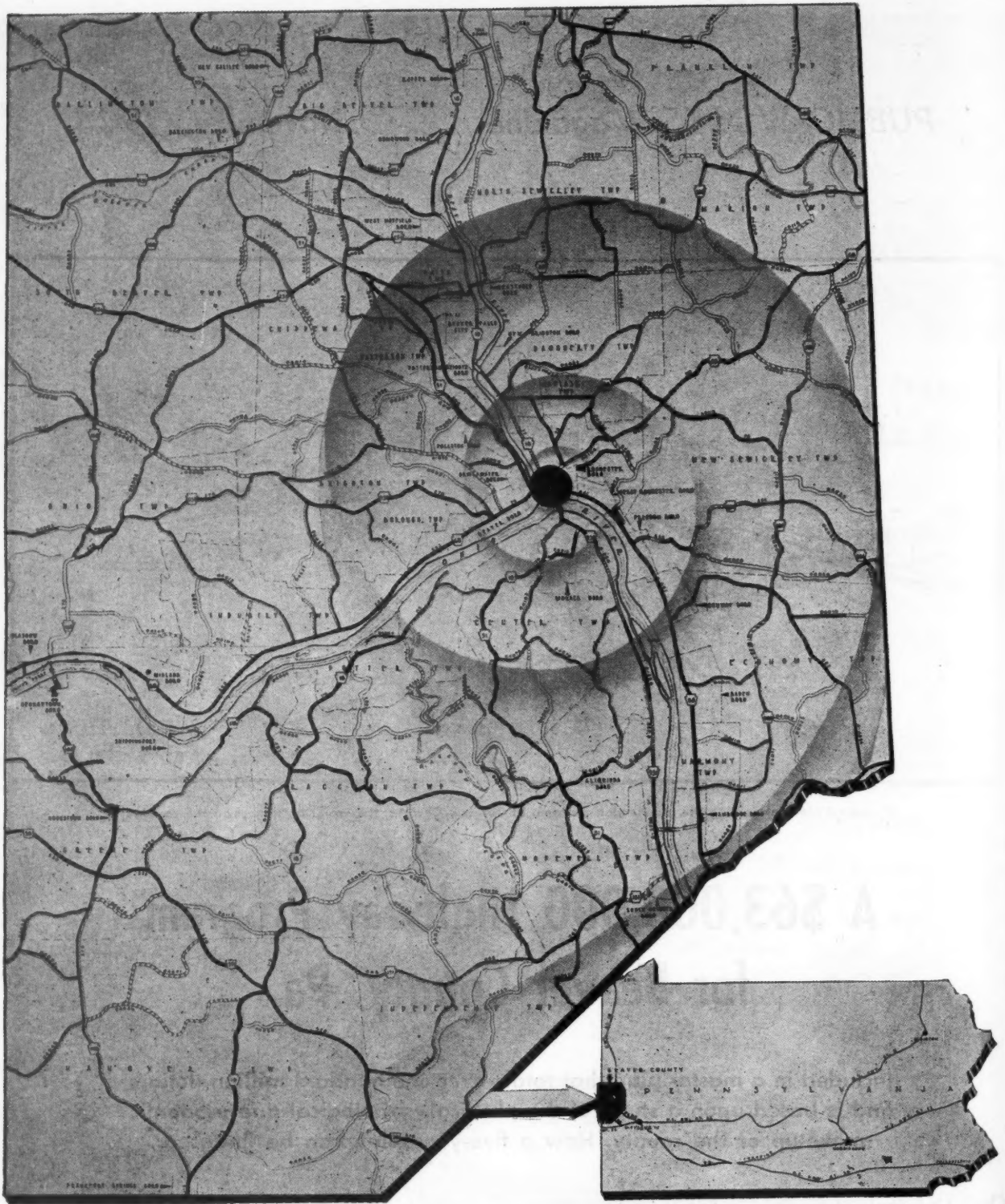
PLANS have been made for highway improvements in Beaver County, Pennsylvania, which are estimated to cost \$63,006,600: a five-year program for post-war construction of the more pressing needs being estimated at \$28,792,700. This includes grade separation and new and improved bridges, as well as extensions, relocations and other improvements of more than a score of highways.

While this is an extensive program for a single county, the projects mentioned above are but three of fifteen included in a master plan for county improvements, the total cost of which is estimated at \$111,470,180. This master plan, which was prepared by The Baker Engineers, is a long-range program based upon an exhaustive study of not only the physical but also the sociological and economic make-up of the county;

not rigid, but elastic and adaptable to community trends. For, says Michael Baker, Jr., in the report, "sound planning is a continuous process and periodic changes in the program should be fostered to the point of revitalizing the plan by current corrections."

The data collected as a basis for this planning included a survey of public opinion as well as pertinent facts and statistics, in the belief that "it is more important to plan *with* the citizens rather than *for* them." The data were searched for at all manner of sources, analyzed, and combined into seven general groups: The people, the land, transportation and communications, housing and schools, industries, sanitation and stream pollution, and financial.

A brief summary of the transportation situation in the county indicated that planning for the future will



Beaver County and its highway system. See below for explanation of road symbols.

be primarily a question of improvements in existing facilities. The railroads and waterways appear to be adequate for many years. A number of improvements in the highways, however, are desirable. The report lists, for the 5-year plan, relocation of sections of Routes 51, 68 and 88 totaling 14 miles and costing \$4,236,000; a 2.45-mile extension of Ohio River Boulevard at a cost of \$3,075,000; improvement of State, county and rural roads to cost \$7,329,000. It is expected that the county would have to pay only \$1,526,000 of the cost of all this work, the Federal government contributing \$1,000,000, local communities \$500,000, and the State the remainder. In addition, it

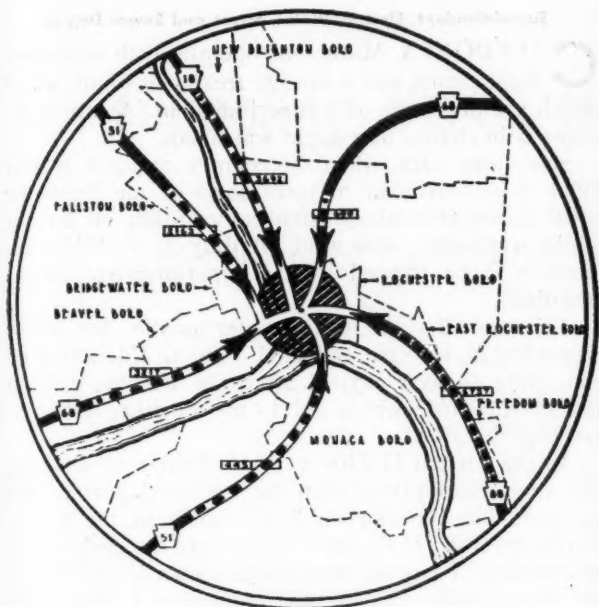
is proposed to build two bridges and improve two others at a cost of a little under four million dollars, most of which would be paid by the State. The reasons

ROAD SYMBOL	TYPE	MILEAGE
	CONCRETE	156.48
	BRICK	11.60
	DURK TOP - VARIOUS BASE MATERIALS COVERED WITH AN ASPHALT WEARING SURFACE.	297.13
	STOP, GRAVEL OR SLAG - NO SURFACE TREATMENT EXCEPT OCCASIONAL OILING.	42.32
	CINDERS OR "RFD DOD" (BURNED MINE WASTE)	12.32
	EARTH NO SURFACE TREATMENT.	113.39
TOTAL		593.44

for each of these projects is explained in detail in the report.

A study of traffic routes and traffic flow showed that all major highways traversing the county pass through the Conway Corner area, resulting in a tremendous bottle-neck at this point. This presents one of the major highway problems of the county. Route 88 alone at this point carried an average of 13,474 vehicles a day in 1941, of which 2,376 were commercial. There are eight other routes leading to this bottle-neck, all less traveled but with about 1,400 vehicles a day on the route with the least travel.

In general, the main traffic routes of Beaver County are outmoded in road design and structures in com-



Enlarged plan of the black circle on page 12, showing traffic on the different highways. Each dot represents 500 vehicles in 24 hours.

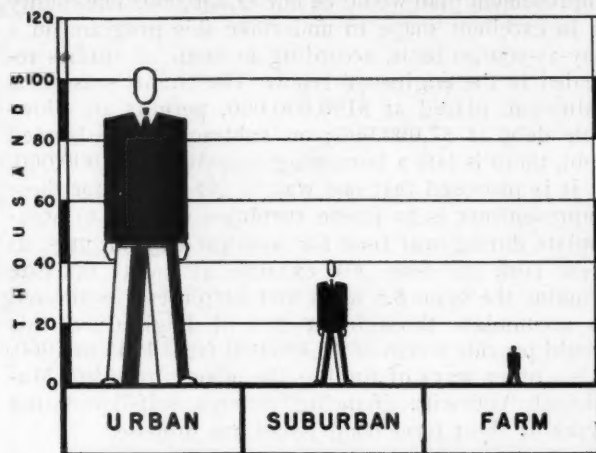
parison with the increased amount of passenger and truck use during the last 20 years. Many of the routes need complete realignment in direction and grade, either because of initial poor location or because unforeseen circumstances of later years created inefficient traffic handling.

"There is much controversy possible in the choice of a hard and fast rule for the actual design of streets and highways. Local conditions and environmental factors are bound to enter the picture and in every case these must be considered. However, there are a few proposed and workable street and highway sections shown (in the accompanying illustration) in the form of suggestions for the various types of streets and highways that could be utilized in Beaver County."

Highway beautification has been shelved for the duration but must play an important part in long-range planning. Beautification is effected not only by landscaping, but "the over-all alignment and grade of roads, the creation and retention of vistas, the control of highway advertising, in addition to the actual design of the highway itself with its medial strips, all become an integral part of any road beautification program."

In connection with highway planning, the engineers considered adequate bus terminals for the 15 bus companies operating on 22 routes in the county. It should be possible, they think, to finance such terminals and stations by inducing the several companies to cooperate

POPULATION BY LAND DIVISION

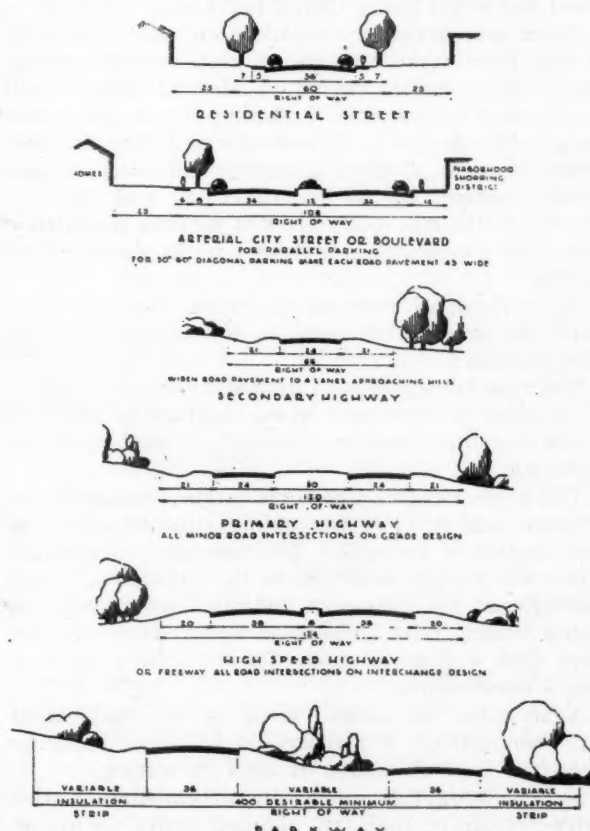


Population of Beaver County by land divisions.

and furnish the funds necessary for the project on the basis of the traffic loads carried. The highway improvements proposed would permit ever faster schedules and increased efficiency of bus service, making improved terminals increasingly important.

Financial

It is believed that only a small part of the cost of the 5-year plan will have to be provided by the county. Private funds are counted on for \$18,565,000, chiefly for housing developments, hospitals and local community improvements. The State is expected to provide \$15,526,000, chiefly for highways and bridges, and Federal aid for schools, flood control, soil conservation, reforestation, rural roads and housing to total \$7,815,800. Local communities will be expected to contribute \$4,840,800 for schools, hospitals, sewers and sewage treatment, and streets and other local improvements.



Some suggested right-of-way limitations.

Thus the cost to Beaver County of this five-year improvement plan would be but \$2,736,000. The county is in excellent shape to undertake this program on a pay-as-you-go basis, according to financial studies revealed in the engineers' report. The county's assessed valuation, placed at \$100,000,000, permits an allowable debt of \$7,000,000; or, subtracting the bonded debt, there is left a borrowing capacity of \$4,000,000.

It is proposed that one way to get money for these improvements is to freeze surpluses allowed to accumulate during war time for post-war expenditures, as New York has done. For example, if county tax rate remains the same 8.5 mills and surpluses are allowed to accumulate through an Act of Legislature, this would provide a sum of \$5,406,000 from 1945 to 1960. Also, other ways of finding the money by using Municipal Authority financing through self-liquidating types of short term bond issues are proposed.

Protecting Concrete Against Action of Sulphate Water

For a number of years the Public Roads Administration has been conducting alkali-resistance tests on concrete surfaces treated with various protective materials such as water-gas tar, coal tar, paraffin, lubricating oil and linseed oil. From the field and laboratory data, it was concluded that water-gas tar of proper quality is readily absorbed by cement mortar and concrete, the rate of absorption varying, however, with the manner of curing of the concrete, age, and density of the mix. Furthermore, it was concluded that four coats of water-gas tar applied at the rate of about one-fourth gallon per square yard of surface, followed by one coat of coal tar appears to afford adequate protection against alkali attack, provided the concrete is of good quality, has been properly fabricated and is not leaner than a 1:2:4 mix.

From subsequent investigations on alkali resistance it was found that concrete of high cement content, cured for a limited period in air and treated with water-gas tar, is capable of offering appreciable resistance to alkali attack. It was observed that the protection against alkaline waters is influenced by the cement content, the method of curing and the consistency of the mix. Rich mixes of medium consistency cured for a minimum length of time in air gave best results.

As a result of tests on specimens that were continued for seven to ten years, the following conclusions were reached:

Concrete fabricated with cement having a low ratio of alumina to iron was more resistant to sulphate action than was concrete containing cement having a high ratio.

The application of water-gas tar to concrete either by immersion or by brush coating afforded about the same degree of protection. The resistance to sulphate action was greatly increased by the addition of a seal coat of coal tar. The data indicated no appreciable added benefit from immersion in water-gas tar for more than 1 hour or from the application of more than 4 brush coats.

Ammonium fluosilicate, alone or in combination with water-gas tar or coal tar, did not afford adequate protection from the action of sulphate waters.

Sodium hydroxide, alone or in combination with water-gas tar or coal tar, afforded better protection than similar treatments with ammonium fluosilicate.

However, all the treatments with sodium hydroxide were distinctly inferior to the treatment with water-gas tar followed by a seal coat of coal tar.

The resistance of the treated concrete was influenced by the character of the concrete and by its curing prior to treatment. Concrete of the richer mix having the lower water-cement ratio was more resistant than concrete of the leaner mix with the higher water-cement ratio. Also concrete cured for a short period (1 day) in air prior to treatment was more resistant than concrete cured for a longer period (7 days).

Automatic Control of a Lighting Circuit

By ABNER HOUGE

Superintendent, Electric, Water, Street and Sewer Depts.

CALDONIA, Minnesota, operates both water and light plants and a sewage treatment plant, all of which are in charge of a superintendent. At night the plant is in charge of a night watchman.

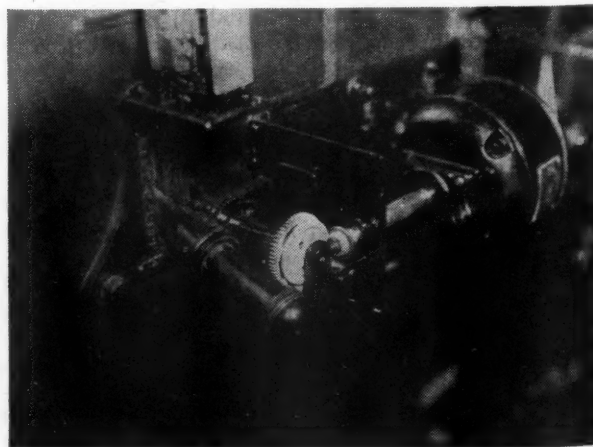
Some time back, when the country changed to war time, it was decided to leave some of the lights on until dawn, instead of having them shut off by the night watchman, who went off duty at 4 A.M.; the breaker to be tripped by the superintendent in the morning.

This was all right in the winter months, but as the dawn began to come earlier I figured I'd better do something to save myself an early morning trip to the switchboard; which led to my devising the contrivance described.

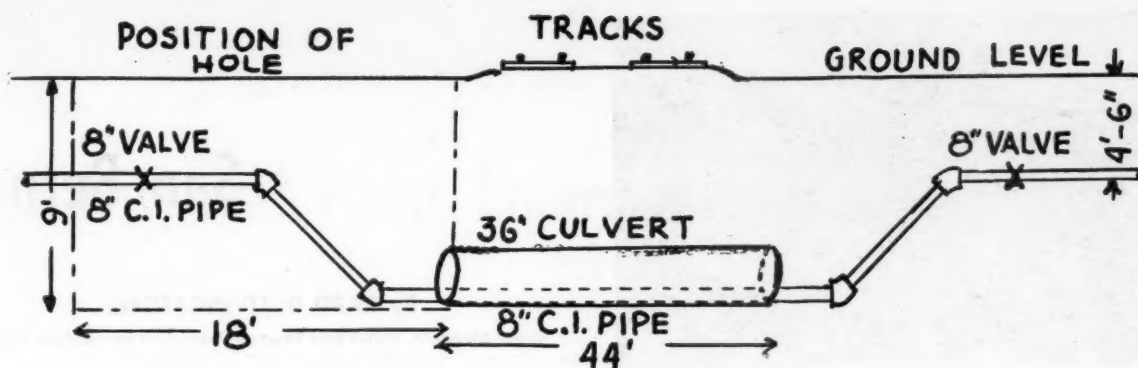
As the current is 2400 volts, I decided to work on the mechanical rather than the electrical part of the breaker. The lone switch lever shown in the photograph controls 114 street lights—one at each street intersection. The gear mechanism shown is part of an old phonograph with the springs removed and a cam attached to the gear closest to the switch board. The motor is a 1/15 h.p., and is started by a time switch from an unused electric meter which will start the motor at any predetermined time, being set each day for dawn of the following day.

When the switch lever of the oil breaker reaches its top position it strikes a trip, which operates the device shown at the top of the picture—a pressure control switch from a stoker. As this little circuit breaker is in series with the motor, the latter stops when the switch lever strikes it. The entire operation takes about 3 seconds.

This device has been in operation for over two years and has never failed to operate.



Photograph of the author's device.



Longitudinal section of crossing under railroad.

Tunneling Mains Under Railroad Tracks

Detail description of how an 8-inch water main was carried under a railroad through a protecting culvert. Digging, jacking and pumping equipment used.

By C. R. RIDINGTON

Superintendent Lansdale Municipal Authority

DURING the year of 1943, one of the local plants doing War work requested water service and fire protection from the Lansdale, Pa. Municipal Authority (successor to the Lansdale Water Company). Our Board decided to lay the necessary pipe to comply with this request. We secured the priority for the materials and, because the pipe would have to run under the main line of the Reading Company double railroad tracks, we signed a contract with this railroad to enter their right of way, in the street, for that part of the project.

The contract with the Reading Company contained a number of restrictions; for instance, that the proposed 8" water mains should be encased in 36" pipe and that the top of this 36" pipe should not at any time be less than 4 feet 5 inches below the base of the rails of the tracks.

We ordered 44 feet of 36" 8-gauge corrugated culvert pipe from the Eastern Culvert Co. in two 12-foot lengths and two 10-foot lengths; the 8" B & S cast-iron pipe from the R. D. Wood Co.; and the leadite joint compound from the Leadite Co. The lumber for shoring was secured locally.

When this material had been received, we dug a hole 8 feet wide, 18 feet long and 9 feet deep, about 8 feet from the nearest rail of the tracks. Hard rock

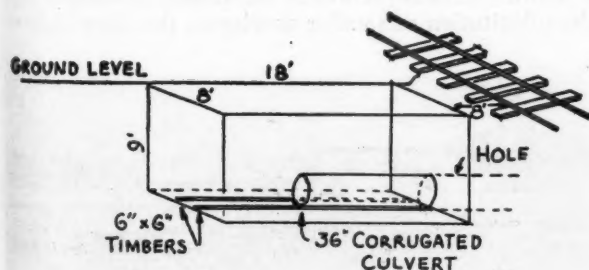
was encountered about two feet below the surface of the street and we hired the Borough Schramm air compressor for drilling this rock and leveled off the bottom after shoring the sides. Then we planted 6"x6" timbers, about 18 inches apart, in the bottom and leveled them to act as a guide for the culvert pipe, as per sketch.

Since the corrugated culvert is apt to "freeze" into the tunnel if the job is not worked continuously, we divided our men into two 12-hour shifts of five men each.

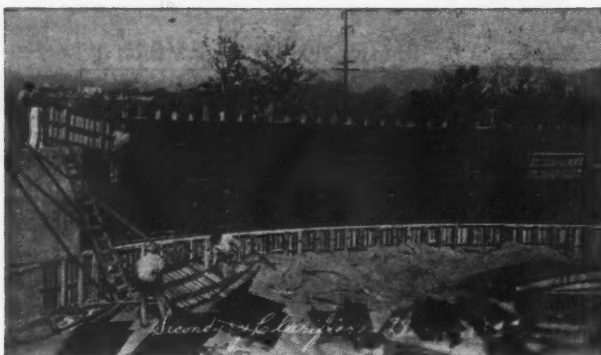
We used a short handled pick and a short handled shovel to do most of the digging and, when we came to harder rock, we used our Black & Decker electric hammer. Electricity was furnished for this tool and for lighting the tunnel by the local municipal electric plant. We took a steel wheelbarrow tray and bolted it to a wooden frame on four iron wheels, attached a rope at the front end and one at the back and used it to haul the dirt out of the tunnel through the 36" culvert pipe. We also made a rough lumber frame above the hole and placed canvas over it and down one side for protection from the weather. The Electric Department truck with boom was hired when needed to place the culvert pipe in a horizontal position on the skids in the hole. We also made a wooden templet about 6 feet long to act as a guide at the end of the pipe to see that the hole for the corrugated pipe had about an inch clearance before pushing the pipe. A heavy railroad jack was used to push the pipe.

After the first length of culvert pipe had been lowered into the hole and placed on the 6"x6" skids against the end nearest the tracks, a man crawled into it with his tools and light and started to dig. Some of our men are over six feet tall and quite "husky" and they were confined to cramped quarters in the culvert. However, the fact that they alternated about

(Continued on page 30)



Operating hole for excavating tunnel.



Placing forms and reinforcement for the secondary clarifier.

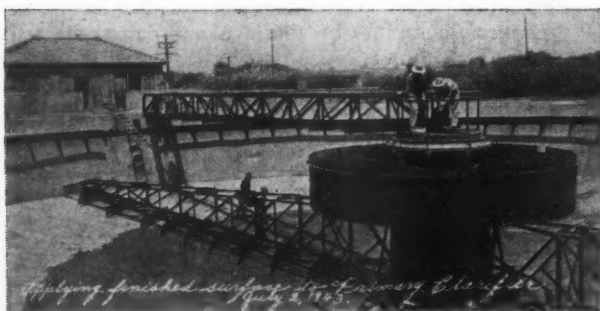
PRIOR to the advent of this country into World War No. 2, San Bernardino, California, was a city of 40,000 people with a sewage treatment plant employing Imhoff digestion and biologic filtration. This plant was completed and put into operation in 1929 and was designed to take care of an average daily flow of 4.2 mgd, and a maximum hourly rate of 7.0 mgd.

The plant consisted of four 40-foot diameter Imhoff tanks located on each side of the main control house and two dosing chambers which discharged onto trickling filter beds which are approximately 200' x 260' in area.

From these beds the effluent was taken to a secondary clarifier 40 feet in diameter, from which the effluent was finally discharged in Warm Creek.

In 1942 we were informed by the U. S. Engineers Office that an Army Air Depot was to be constructed near San Bernardino and that studies had indicated it would be more feasible to enlarge the city's disposal plant to take care of the sewage from this than it would be to construct an entirely new plant for the Army use only.

Estimates of personnel at the Depot, as submitted by the U. S. Engineers Office, were as shown in the accompanying tables.



Applying finished surface to the primary clarifier.

It was estimated by the U. S. Engineers that a plant to treat the sewage from the Air Depot would cost \$212,000, and the operation, based on \$20 per million gallons for a period of 50 years, would run to approximately three-fourths of a million dollars.

Our consulting engineers estimated that to enlarge our plant to take care of the additional load would cost approximately \$250,000. After considerable negotiations with the Federal Government it agreed to pay the city \$225,000 for the enlargement of the plant and the

San Bernardino

By BARD D. LIVINGSTONE

Superintendent, Water and Sewage Dept., San Bernardino, Calif.

Estimate of total additional population to be connected to the San Bernardino Disposal Plant.

Depot Population		Percent To Be Treated	Connected to Disposal Plant
Classification	Number		
Mobile unit	5,000	100%	5,000
Depot Personnel	3,000	50%	1,500
Civilian workers	6,000	40%	2,400

Total population connected to disposal plant.. 8,900

Additional City Population Determined by Depot Personnel

Classification	Number	Percent To Be Treated	Connected to Disposal Plant
Depot personnel family (wife and child)	6,000	100%	6,000
Civilian workers	6,000	60%	3,600
Civilian workers family (wife and two children)	18,000	100%	18,000

Total additional city population..... 27,600

Total Population To Be Treated at San Bernardino Sewage Disposal Plant

Depot population	8,900
Additional city population	27,600
Total	36,500

disposal of the sewage from the Depot for a period of 50 years.

In order to increase the size of the plant, it was decided that the most feasible and economical design would be one which would expand the capacity of the present plant to the limit of the capacity of the existing filter beds. This could be done in five ways, all of which were used in the new design.

First—Pre-aeration of the sewage before sedimentation.

Second—Construction of a primary clarifier with an overflow rate of 800 gallons per square foot per day.

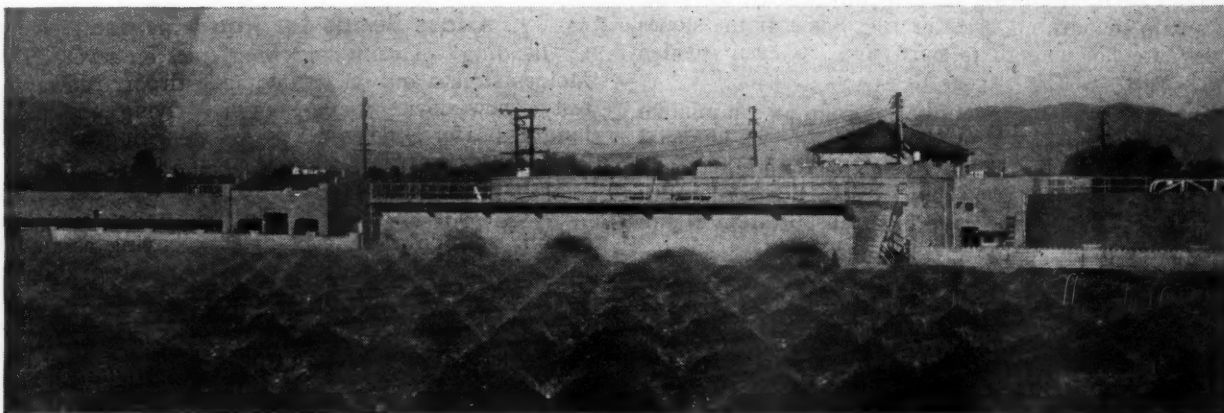
Third—Reconstruction of the dosing chambers and the substitution of smaller nozzles on the filter beds so



The primary clarifier.

Waste Disposal Plant Enlargement

Doubling the capacity of the plant was necessary to treat the sewage from an Army Air Depot and the resulting addition to the city population. This was effected by pre-aeration, construction of primary and secondary clarifiers, and increasing the capacity of the sprinkling filters and digestion tanks.



General view of the disposal plant.

that the rate of application would be materially decreased and the time of application correspondingly increased.

Fourth—Construction of a secondary clarifier providing the same low overflow rates as the primary.

Fifth—Increasing the sludge capacity of the digestion tanks. This was accomplished by converting the Imhoff tanks to two 2-stage digesters.

It was also necessary to construct a standby primary clarifier, as neither the complete by-passing of the plant nor the application of unsettled sewage to the trickling filters would be practicable. In order to accomplish this, a secondary clarifier was constructed of the same size and with the water level at the same elevation as the primary so that it could be used as a standby unit. This has necessitated the pumping of the effluent of the trickling filter approximately 20 feet to the elevation of the secondary clarifier.

There were installed two Fairbanks-Morse 16" hori-

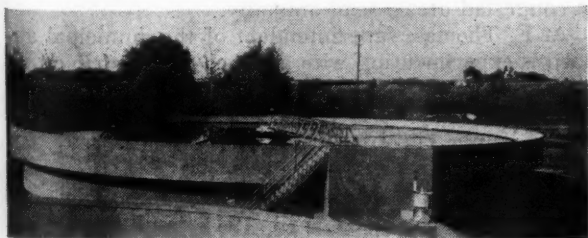
zontal booster pumps of 6,000 gpm capacity. One pump was connected to a 50 hp electric motor and the other to a Buda gas engine operated on sewage gas. The gas engine has sufficient capacity to handle all the effluent, and the electric unit is used as a standby pump.

For the aeration of the incoming sewage, two Sutorbilt rotary positive blowers were installed, connected to an electric motor and to a Pacific Enterprise gas engine. Both gas engines are cooled with "Vapor-phase" cooling systems and have proven very satisfactory.

The equipment installed in the clarifiers and digesters was furnished by the Dorr Company.

As completed and now in operation, the plant was increased from a capacity of 50,000 people to a capacity of 90,000. The results we have obtained from the operation of the new plant have been outstanding. The dissolved oxygen content is raised from zero at the influent trough to 5.2 ppm at the secondary clarifier. In the old plant there was a daily use of 272 lbs. of chlorine treating a flow of 4.3 mgd. The daily use of chlorine at the new plant is 109 lbs. treating 5.2 mgd. The BOD reduction is 96%.

The Currie Engineering Company of San Bernardino were the consulting engineers, with Frank S. Currie directly in charge. All construction work was performed by the San Bernardino Municipal Water Department under the supervision of Bard Livingstone, superintendent; L. A. Hosegood, engineer, and C. F. Hippenstiel, construction foreman. The total cost of the project was \$258,827.38.



View of the secondary clarifier.

Constructing Base for Asphaltic Mat from Coal Mine Shale Piles

Crawford County, Kansas, constructs high-type roads, using, as a base, stone obtained from shale piles at abandoned coal mines, with chatt and road oil as a surface.

By W. T. NIGGEMANN

County Engineer, Crawford County, Kansas

THE eastern and southern half of Crawford County, Kansas, contains numerous shale piles from abandoned coal mines which operated forty to fifty years ago. When these mines were in operation the sulphur stone, rock and slate were trimmed from the roof and hauled to the surface and stock-piled. Down through the years the weather conditions have caused the sulphur to burn, producing heating which acted the same as a kiln in burning brick or tile. Some of the stones today are hot enough to burn tires, or even wooden truck beds.

Our road and bridge fund has been at a minimum in the past few years; but in spite of the financial limitation there has been a demand for higher type roads, since we have two chemical plants in our locality which carry heavy truck and bus transportation to and from these plants daily.

Desiring to meet this demand we have, during the past two years, been experimenting with red shale in various parts of the county where holes had developed in the road bed, having found that neither chatt nor rock would stand up satisfactorily under the heavy traffic. We found that this red shale was highly suitable for this purpose, and from that we conceived the idea of using it extensively for base.

We purchased a $\frac{3}{8}$ cu. yd. Austin-Western Badger shovel to load our trucks and to bring the cost of loading to a minimum. The trucks transport this material to the road location, where it is dumped in stock piles along the shoulder line at the rate of 2,500 cu. yds. per mile. After this, the larger rocks are hand-sledged into suitable size or spalls. Then an International TD18 tractor and Adams power control grader, with the help of a Caterpillar Motor Patrol, spread the material to a uniform depth over the prepared road bed. After this, a sheepfoot roller is used to break the oversized rock and make a fine grade of dust on the surface, so that the road can be opened to the traveling public. About 250 cu. yds. of chatt is applied to the mile so that the maintainer may have enough loose material to keep the road in good condition. The road is then left open to the public for several weeks, the length of time depending upon the weather conditions. The traffic and moisture tend to compact the dust and stone to a solid surface, in addition to which we use a 10-ton tandem power roller daily to help to compact this shale into a smooth surface and make an ideal finish for a black-top road.

Upon the compacted red shale base 100 pounds of mine chatt to the square yard is placed, after which one gallon of RC3 road oil to the square yard is applied. With the use of road maintainers this material is blade-mixed and spread evenly over a width of 20 ft. and rolled with the 10-ton tandem roller. An appli-

cation of AC road oil at the rate of .25 gallon to the square yard, with 18 pounds of mine chatt uniformly spread, is then rolled to make the completed 1" mat.

With this low cost of construction per mile, Crawford County in the future may build up a system of high-type roads with the minimum amount of monies levied to the road and bridge fund.

Glass Beads for Road Stripes

"Beading" of center marking lines on several Des Moines streets and on a municipal airport runway to test a new device making night driving and night landings safer is now under way, according to Robert J. Hassett, city traffic engineer.

In an effort to minimize accidents at dangerous curves, glass beads which reflect light are embedded in a paint strip down the center of the paving as an aid to night drivers. Consisting of clear salt-grain size glass spheres, the globules are embedded in the paint strip by a specially designed dispenser which is trundled along after the paint-striping machine.

The prism-like particles in the regular paint strip at hazardous points will make the center part in the street glitter in moonlight or mist, a sort of glowing "life line" to keep motorists where they belong and to warn of danger, Hassett said.

The exposed particles aid visibility, serving as minute lenses to refract and reflect the light from automobile lamps. Under ordinary conditions, the reflection from the "beading" can be picked up as soon as the car lights touch it. The particles are guides to channelize traffic in a fog, keeping it on the right side of the road, and they are effective during the day. The striping shines out to show bends and curves, including the sharp curve at the end of a long highway straightaway, and dark angles on streets, clearly indicating the direction of the turn.

Six pounds of beads to a gallon of paint will brighten a 4-inch strip 265 feet long. Application of the striping, including labor, costs approximately 5 cents a foot, in comparison with 4 cents for the usual white paint.

Hassett said that the new marking should have three times the wearing quality of the paint, as the glass particles help to preserve it. Previous to the "beading" treatment, all strips have been painted annually, and in congested areas, semi-annually.

A. E. Thomas, superintendent of the municipal airport, is experimenting with a 6-inch center strip on the 4,500-foot north and south runway.

The "beading" has been used successfully on the Pennsylvania Turnpike which carries much heavy, fast moving traffic in peace time.

Tests of this use of beads were made on Ohio roads and described in the April 1941 issue of PUBLIC WORKS.

Partial Reconstruction of Ardmore City Lake Dam Due to Slippage

Slip of down-stream face of an earth dam after 40 years use caused by unusual height of water in the reservoir after excessive rains.

By CLARENCE HARRIS

City Manager, Ardmore, Oklahoma

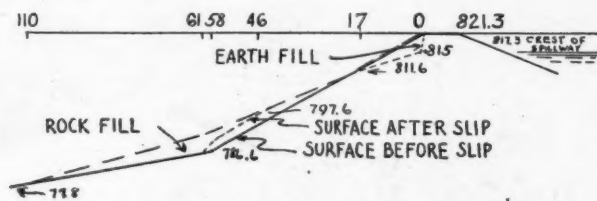
ON the morning of May 1, 1942, the City of Ardmore, Oklahoma, experienced what could have been a major catastrophe, due to the slippage of approximately 150 feet of earthen dam (which is approximately 1500 feet long) of the city lake, Ardmore's principal water supply. My reason for saying this could have been a major disaster is that all the city pumping, filtration and purification equipment (valued at \$200,000) is located directly below the dam, some fifty feet lower than the surface of the lake. All the machinery and equipment would have been heavily damaged if not completely destroyed had the dam gone out.

Ardmore City Lake covers about 200 acres of land and is sixty feet deep at the deepest point. It is formed by an earth dam with face slopes of $1\frac{3}{4}$ to 1. The spillway is located, not in the dam, but in a gap where there was solid rock near the surface, on which rock was built a concrete weir wall 7 ft. high, 12" thick at the top and 36" at the bottom and 80 ft. long; this wall being set in a trench in the rock $3\frac{1}{2}$ ft. deep and so rising $3\frac{1}{2}$ ft. above the overflow slope, which was excavated in the rock and paved with 9" concrete on a slope of 1 in 4.

The dam was built in 1901 and had never before given any trouble. But at the end of April 1942 excessive rains and limited spillway capacity caused the reservoir pool to rise to an elevation only about 3 feet below the crest of the dam. This apparently increased the saturation of the earthen embankment to such an extent that a major slide occurred on the downstream slope near the center and point of maximum height of the dam. The downstream face of the dam for a depth of 11 feet from the crest broke away in a wedge shape and slid down the slope, leaving the thickness of the dam at spillway level only about 18 feet for the full length of the slide—approximately 150 feet.

Immediately upon the discovery of the slide, in order to relieve the hydrostatic pressure on the dam and to provide for immediate release of the probable additional inflow, at least one-half of the weir wall was removed.

After a series of conferences with Morris C. Burke, WPA engineer, Mr. Wilson, engineer for the Santa



Cross-section of dam before and after slip occurred.

Fe Railroad, Marion Burton, district superintendent for WPA, and Sam P. Matthews, city engineer, an emergency stabilization project was agreed upon and work started immediately by the city with the cooperation of WPA.

Due to the slip, the downstream slope of the dam had been reduced to approximately 2 on 1. In order that stabilization be secured as speedily as possible, and to prevent the wedge from slipping completely out, a ditch 5 feet wide, 3 feet deep and 200 feet long was excavated at the downstream toe, beneath the slide, and a rock fill was placed at the toe of the slide on a slope of $2\frac{1}{2}$ on 1, for a width of about 65 ft. and maximum depth of about 6 ft., which broadened the base of the dam by about 50 ft. and stopped the slide. Some 125 men and 20 trucks were used to place the 1452 cu. yds. of rock used to make this fill.

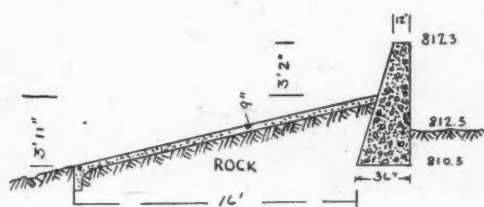
Then 1832 cu. yds. of dirt was used to complete the fill at the top of the dam, replacing that which had slid out; after which all the area over and adjacent to the slide was sodded with rye grass. For leveling the area around toe of slide and windrowing dirt for fill, an Adams patrol grader was used to mighty good advantage.

The permanent reconstruction of this dam will be one of Ardmore's postwar problems.

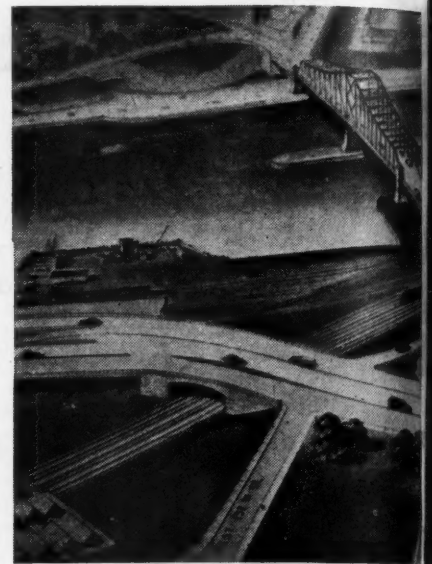
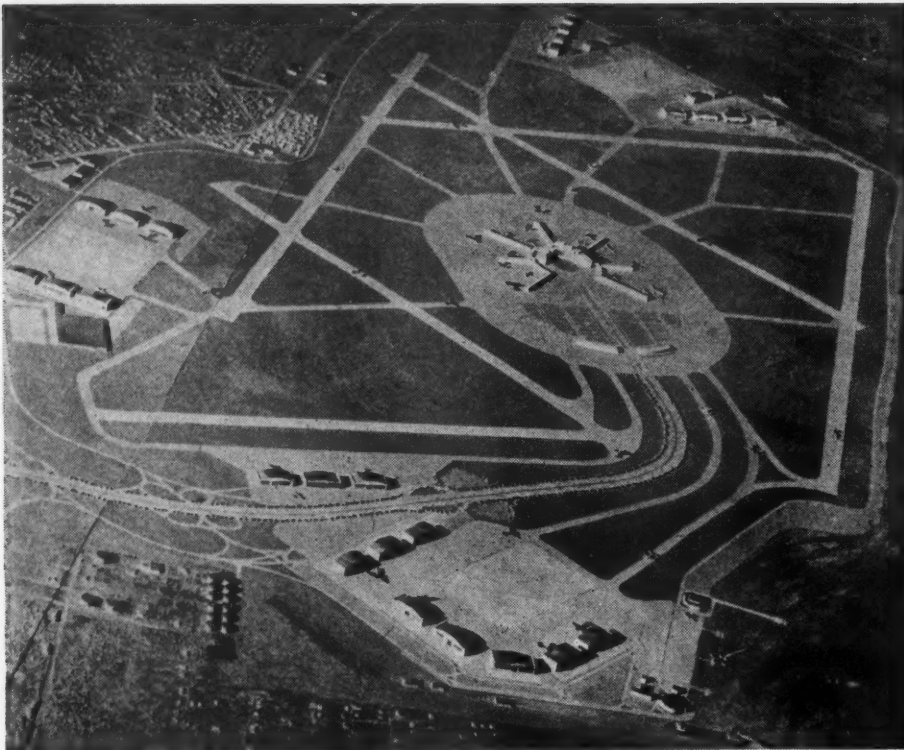
Surcharge to Residents Outside District Held Discriminatory

A waterworks district in operating its waterworks charged the residents in other districts the same rate as in its own. The waterworks was turned over by the district to a city pursuant to statute. An ordinance of the city fixing water rates, enacted thereafter, which proposed to charge the residents in the district which turned over the plant to the city a surcharge, was held invalid as making an unreasonable discrimination, in the absence of a change of conditions or additional expenditures, etc.

The city could pass an ordinance reasonably classifying customers as to distance, location, expense of delivery, etc., or any other material conditions distinguishing them from each other or from other classes. (City of Malvern v. Young, Arkansas Supreme Court, 171 S. W. 2d 470.)



Cross-section of the spillway.



PROPOSED ELIMINATION OF GRADE CROSSINGS AT

Left: General plan of Idlewild airport, showing administration building surrounded by three hangar groups. Lower left, proposed tank farm. Lower right, proposed sea-plane base.

New York City's \$1,270,000,000 Postwar Program

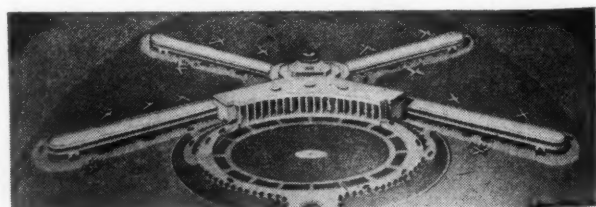
NEW YORK CITY's planned \$1,270,000,000 postwar works program has taken on a more definite shape in the proposed budget prepared by the City Planning Commission, headed by Chairman Edwin A. Salmon. To enable the citizens to obtain a definite idea of what is proposed in this program, the Commission has had on public exhibition for several weeks plans of its several features, together with scale models of the more important structures. The illustrations herewith are from photographs of a few of these several score models, which are designated "three-dimensional plans."

The program recommends the expenditure in 1945 of \$198,317,594 by the city; \$147,308,861 in federal aid is sought and \$7,500,000 from the state. The largest single item in the budget is for the Idlewild Airport, a 4,057-acre global airport in the Jamaica Bay section of Brooklyn which is intended to be the largest in the world. For this airport the 1945 budget allots \$15,000,000, which will be matched by another \$15,000,000 in federal aid. \$15,769,500 has already been appropriated and \$8,889,500 is available from the sale of Floyd Bennett Field. The total estimated cost of the completed project is \$71,636,715.

LaGuardia Field also is in the proposed 1945 budget for \$750,000 for completion of pending improvements and extension of the field, \$262,500 for construction of bulkhead wall, fill and acquisition of property for a seaplane base, \$75,000 for water services for the seaplane base and land plane area, \$20,000 for either

radio equipment or lighting, \$115,000 for construction of sheet-pile bulkhead wall and dredging of channel at Jackson Creek boat basin, \$52,000 for a utility building and \$40,000 for an addition to the loading platform. Except on the sums for water service, loading platform and radio equipment or lighting, federal matching funds are to be requested.

Among the first of the other large improvements in this program to be put into actual construction probably will be the Harlem River Drive. For this, the budget includes \$1,322,750 for a marginal street or wharf and bulkhead, including land, from 125th Street to Second Avenue and thence to 140th Street, about 60% of which the government will be asked to match. This drive is expected to be the center of extensive private and City Housing Authority apartment projects, including the Metropolitan Life Insurance Company's \$6,000,000 Riverton Houses and the city's \$7,293,000 Abraham Lincoln Houses and \$8,000,000 James Welton Johnson Houses.

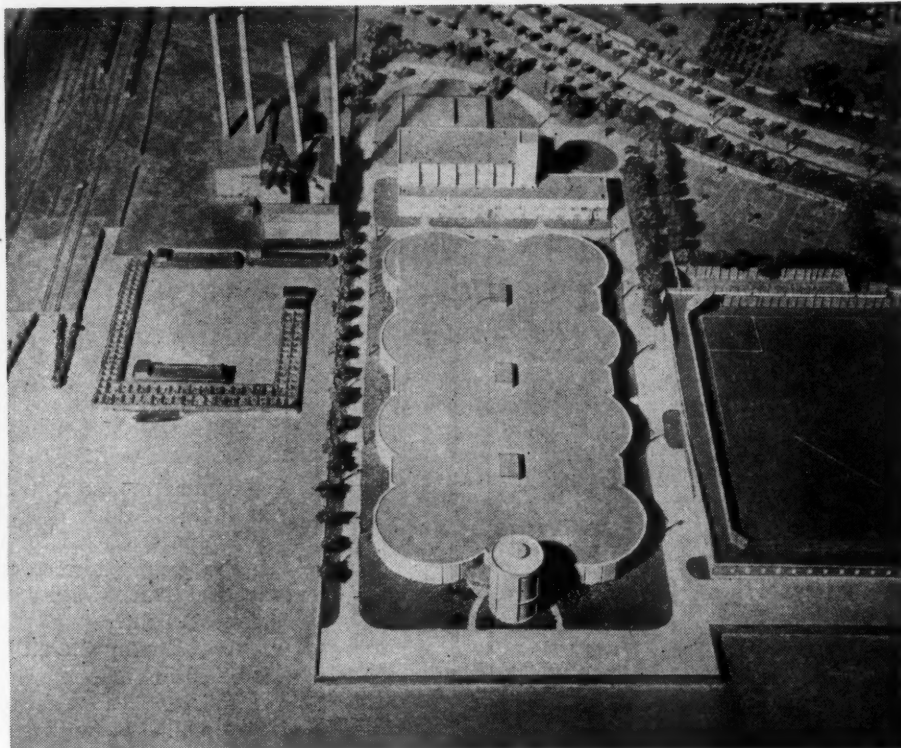


Administration building at Idlewild airport.



CROSSINGS AT MACOMB DAM BRIDGE

Right—Principal sections of Owl's Head sewage treatment plant, estimated to cost \$14,500,000.



Includes construction of the largest airport in the world; of miles of new streets and repairs to existing ones; construction of and extensions to sewage treatment plants; hospitals, schools, housing development and other features, at a total cost of over \$150 per capita.

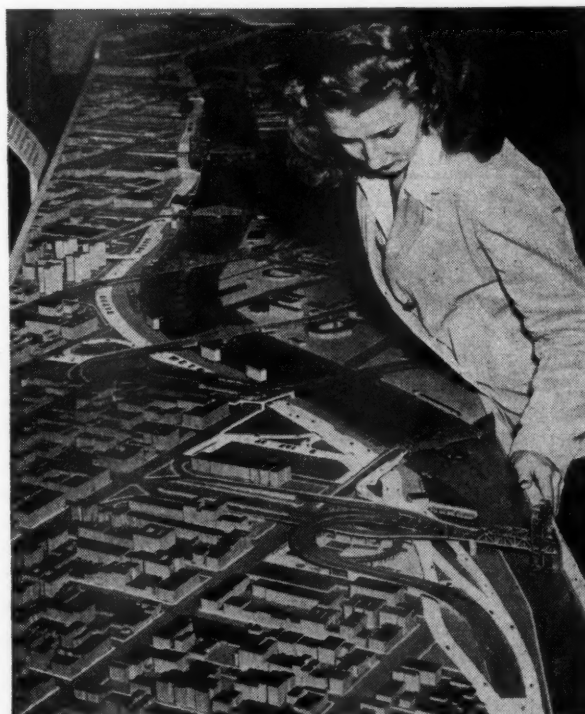
A number of other pier, bulkhead and marginal thoroughfare projects are proposed, including an East River marginal street between 22nd and 26th Streets and between 30th and 49th Streets, Manhattan; reconstruction of approaches to St. George Ferry Terminal on Staten Island and a number of pier improvements. It is proposed to spend \$3,466,700 for improvements and repairs to eleven bridges and bridge repair shops.

Another major feature of the program is the construction, extension and improvement of sewage treatment works, for which \$19,755,000 is allotted. These include the works designated as the 26th Ward, Rockaway, Hunts Point, Coney Island, Jamaica, Owl's Head, Port Richmond, Newton Creek, Wards Island, and Bowery Bay. Of this sum, \$7,200,000 is for Wards Island and \$30,000 for sludge vessels.

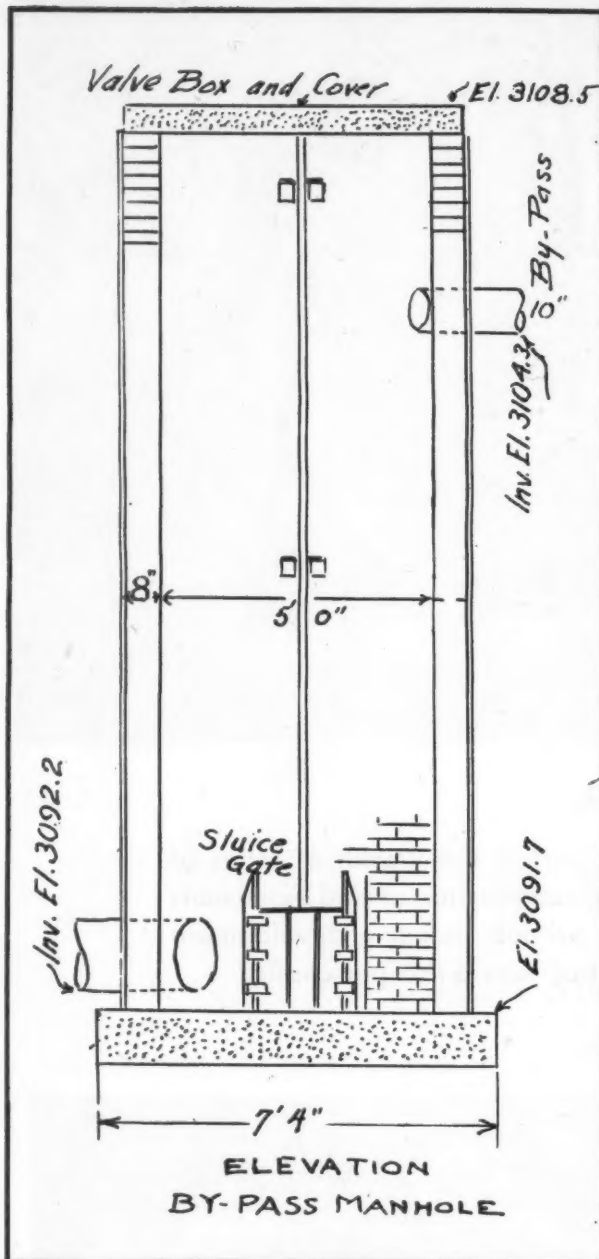
For the Parks Department, the 1945 budget would contain \$20,291,313, to be used for 25 park and parkway projects in the several boroughs. The Board of Water Supply would receive \$2,200,000 for continuation of construction on the Delaware water system. The Dept. of Water Supply, Gas and Electricity (which is in charge of the water distribution system within the city limits) would receive \$6,214,000, of which \$1,000,000 is for street lighting.

The remainder of the project included hospitals, schools, public health substations and laboratory, libraries and public markets.

(Continued on page 28)



The planned Harlem River Drive is shown in white on the model. Left center are the Abraham Lincoln houses, for which condemnation proceedings have started. Just above them is the site of the Metropolitan Life Insurance Company's project "Riverton."



Section of the by-pass manhole.

IN 1939 the city of Carlsbad, New Mexico, built an extensive supplement to its existing sewerage system, so that it now covers the entire city. During the construction some difficulty was experienced with quicksand, which was especially serious on the Main Street interceptor. This was a 15" vitrified pipe laid in an alley parallel to and east of Main Street, the depth reaching 17 ft. in one stretch of two blocks between Hagerman and Luckey Streets. The ground here was unstable and the line broke several times after it had been constructed. After a long, hard struggle to repair it, this was thought to have been accomplished. But later the ground over the sewer settled 6 or 8 inches and the sewer carried a heavy flow of sand, apparently washed into it through opened joints.

When it seemed to be impossible to repair this line, it was decided to abandon about 1,800 ft. of it and lift the sewage at the upper end about 14 ft., pumping it into a bypass sewer paralleling the abandoned one and 12 feet east of it, returning it to the original sewer below the abandoned section. The bypass sewer varies

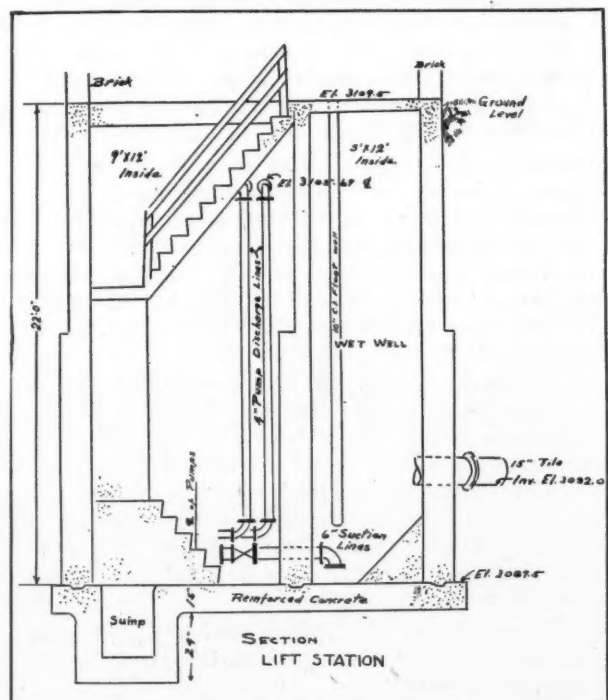
Bypassing Diff

By E. A. ROBERTS
City Clerk, Carlsbad, N. M.

in depth from 6.3 ft. to 9.0 ft. and, since it has a grade of 0.13%, which is steeper than the abandoned one, 10" pipe was used for it. It was laid on an easement from the railroad company whose tracks parallel it only about 150 ft. away. The lift station also is located in this easement.

At the point where the abandoned section begins, an intercepting manhole was built, from which a short line of 15" pipe leads east to a wet well in the lift station. Two pumps in the lift station lift the sewage through 4" pump discharge lines vertically to elevation 3,105.67, then horizontally to a bypass manhole a few feet south, where the 10" bypass sewer begins at elevation 3,104.3. There is also an overflow between the intercepting manhole and the bypass manhole so that, should the pumps stop operating for any reason, the pump house would not be flooded above elevation 3,105.

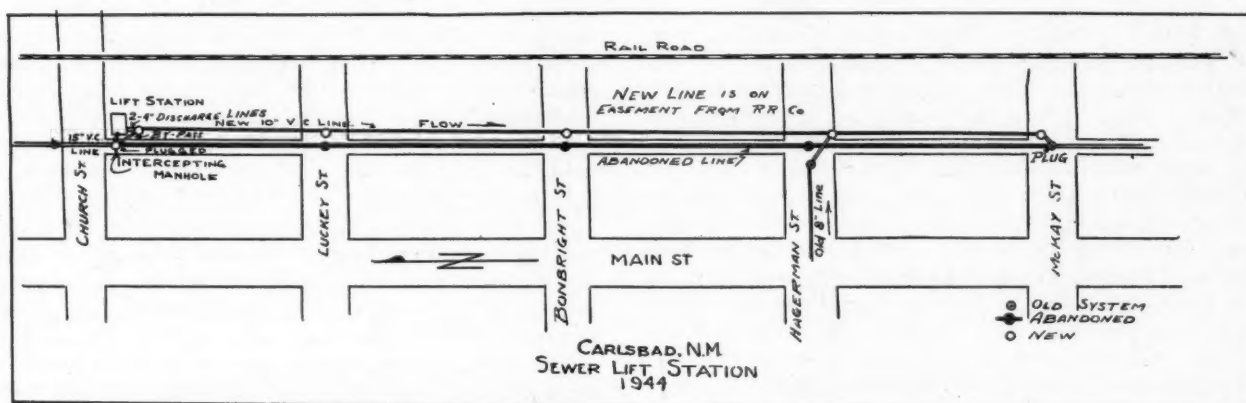
The city employed Black and Veatch to prepare plans and specifications for the work under the direction of Hoyt McMinn, City Manager at the time. A bond issue of \$25,000 was sold and the job advertised for bids. All contractors were busy with war work at this time (the fall of 1943), and in addition the difficult soil conditions had become generally known, so that none of them wanted the job anyhow. Conse-



Section of the lift station.

g Difficult Sewer Construction Job

Construction of a deep section of an interceptor proving difficult, this section was replaced by a sewer laid at a higher level and the sewage pumped into it.



Plan of abandoned stretch of sewer and of the bypass line and appurtenances.

quently no bids were received and the city undertook the work itself, hiring E. Birdsell, a local contractor, to superintend the job.

The first thing to do was to build the wet well and pump chamber. This proved as much of a job as had been anticipated. A drag line with clam-shell bucket was secured to do the excavating, but the bottom of the foundation had to go 8 feet below water level and no pumps could be secured to handle the water. Wood sheet piling was driven around the site and the excavation made inside using the clam-shell bucket; but the sand flowed in under the sheet piling and this could not be retained in position. Finally a well-point system was borrowed from the city of Albuquerque and with this the hole was dewatered, and the base and walls then were poured without any difficulty, and the pump house was finished, including the wet well and pump chamber.

Meantime a contractor had been found who would lay the 10-inch vitrified by-pass line and build the

manholes, and he took over that part of the job after the pumps had been installed. No difficulty was experienced with the line or the manholes on it, but the intercepting manhole was the same sort of a job as had been the original excavation. It was finally completed after various cave-ins and lost time and one fishing job to get the second contractor's power shovel out of the hole after it fell in. To make the job really interesting, the 15" sewer had stopped up below the site of the construction job and there was no way to dispose of the sewage but to pump it into a ditch and run it to the river. As soon as the by-pass line had been laid, the sewage was pumped to it and this intolerable situation cleared up.

The wet well was completed and the plant began operation in February, 1944. It was thought that it would be necessary to install a bar screen ahead of the pumps, and the intercepting manhole was built large enough for this, as no provision had been made for one in the wet well. However, no trouble has been experienced without a screen and no pump stoppage has resulted, so it is doubtful if one will ever be needed.

The two pumps are F. M. & Co. vertical pumps driven by 2-hp, 220-volt 3-phase motors. The normal total dynamic head is 17 feet, ranging from 16 to 19 feet; the rated capacity is 150 gallons per minute, efficiency 40%. The pumps operate on alternate cycles, one at a time, unless the level in the wet well rises above a designated level, when the second pump is set to cut in. On heavy loads both pumps will operate until the level recedes to the second pump cut-in point, when one pump will stop and the other will then handle the flow; and, if it pumps the wet well down, it also will stop.

(Continued on page 30)



The lift station and the author.

The Ortho-Tolidine-Arsenite Test for Residual Chlorine

What it is, how it is made, and results from use of it by a number of waterworks plants. Its advantages as compared with the standard ortho-tolidine test.

ABOUT a year ago Francis J. Hallinan, Jr., analytical chemist, Division of Laboratories and Research of the New York State Department of Health, read a paper before the New York Section of the American Water Works Association describing a "simple ortho-tolidine-arsenite (OTA) field test for residual chlorine and one for chloramine, applicable to concentrations that are likely to be encountered in the treatment of water." (See Water Works Digest in the May issue of PUBLIC WORKS.) Later this test was tried out by 23 water supplies in the state, and the results of this test were presented in a paper by Mr. Hallinan and F. W. Gilcreas, assistant director of the Division of Laboratories, before the recent convention of the American Water Works Association.

The authors say: "It has been known for some time that the ortho-tolidine test did not give satisfactory results in the presence of several interfering agents, chiefly manganese, and that it did not differentiate between active residual chlorine and chloramine, which is less effectively bactericidal. Therefore, other tests were developed from time to time in an effort to elimi-

nate these difficulties. The flash test, in which the regular ortho-tolidine test is read at 15 seconds and at 5 minutes, was an aid in determining the presence of chloramine because the color due to chloramine developed slowly and was, therefore, not included in the reading at 15 seconds. The flash test, however, was hard to read because of the rapidly changing color."

The OTA test uses sodium arsenite to arrest the color development after the free chlorine has reacted with the ortho-tolidine but before the slowly developing chloramine has reacted. This portion represents *active residual chlorine* plus any color due to *interfering agents*. The portion to which arsenite is added first has no color due to chlorine or chloramine, but only that due to *interfering agents*. Thus, if the latter is subtracted from the former, the color due to interfering agents is eliminated and the reading represents only active residual chlorine.

In making the tests, each operator determined four items—free chlorine, chloramine, false residual, and the conventional ortho-tolidine results. Three of the plants, where the untreated water contained significant amounts of manganese, repeatedly reported false residual values.

In seventeen of the reporting plants which did not add ammonia as part of the treatment process, three found the active chlorine to be less than 1/3 of the total residual during the greater part of the time, and six found an active chlorine residual higher than 2/3 of the total residual throughout the test.

Of the six plants where ammonia was added, two found active chlorine residuals greater than 1/3 of the total chlorine, indicating that the dose of ammonia was inadequate for complete reaction with chlorine.

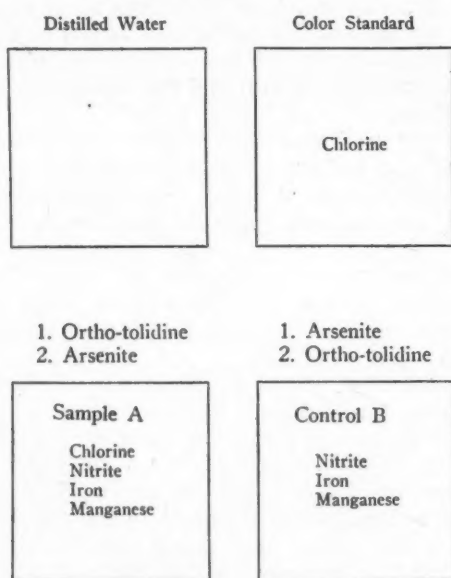
The tests made by these 23 plants represented 659 plant-days, and a false residual was found on 102 of them. On 84 of them the chloramine residual was 0.3 ppm or less, with no active chlorine present.

The results were thought to indicate that this method has two important advantages: It provides a simple method for the elimination of interference, and it enables the operator to determine both active and combined chlorine. Routine use was thought to show that the O-T-A test is adaptable to proper control of chlorination treatment.

In discussing this paper, A. E. Griffin, of the Technical Service Division of Wallace & Tiernan Co., said in part:

"Plant practice has shown that the mere presence or absence of a free chlorine residual is not a conclusive indication of the break-point, because free chlorine residuals can be present not only at the break-point but

Light Source
(North light or light from a fluorescent daylight lamp diffused by transmission through opal glass or by reflection from a matte surface)



A — B = Color Standard

Diagram 1. Determination of chlorine. To be used in connection with the instructions for "Determination of Residual Chlorine by the O-T-A Test" on page 26.



IMPORTANT

Public Health must be maintained!

The necessity of maintaining public health in war time is self-evident. Municipal officers in charge of water purification and sewage disposal have a vital responsibility in guarding the nation's health which should not be underestimated as a contributing factor to final victory.

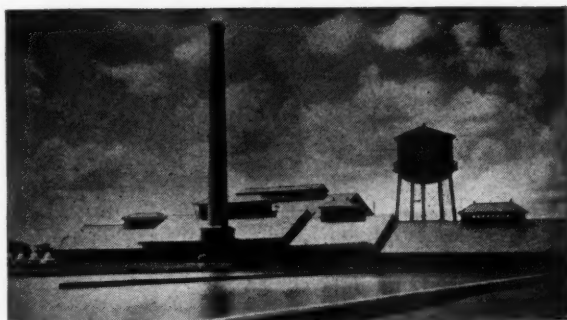
However, the problems of maintaining

public health are *becoming increasingly difficult in the face of material shortages and transportation handicaps*. General's "Alum" will help do the job right. But to ease the situation in regard to *Aluminum Sulfate* as much as possible, won't you place your orders as far ahead as you can so that we may schedule our production on an efficient basis.

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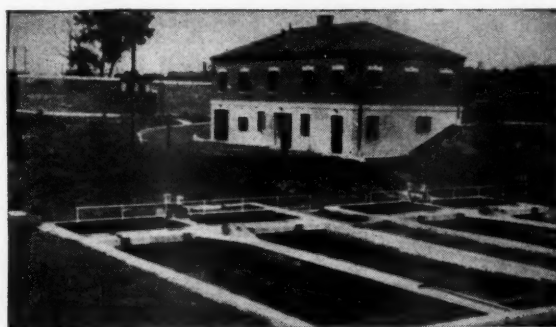
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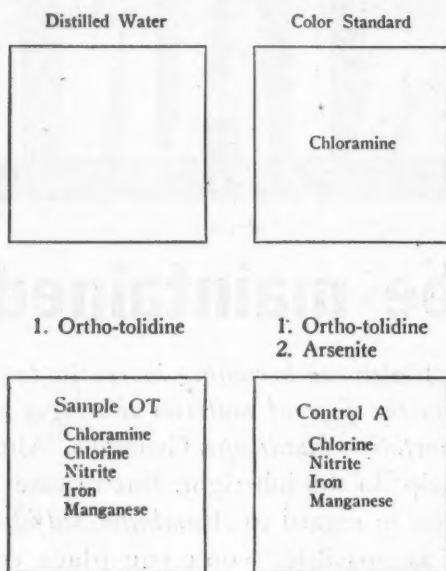
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by transmission through opal glass or by reflection
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OT — A = Color Standard

Diagram 2. Determination of chloramine. To be used in connection with the instructions for "Determination of Residual Chlorine by the O-T-A Test."

also short of that point and, under certain circumstances, they may even be present in the vicinity of the hump. This latter condition can easily prevail in low temperature waters or at high pH values. Thus, the pattern for break-point chlorination reactions become one in which equal quantities of free chlorine and chloramine are present at the break-point; that as chlorination retrogresses from the break the percentage of chloramine increases and the percentage of free chlorine decreases; and that as chlorination proceeds beyond the break the percentage of chloramine decreases and the percentage of free chlorine increases.

"It is now known, both by theory and practice, that break-point chlorination cannot be controlled satisfactorily at the break due to the unstable residual that is obtained at that point. It has been adequately demonstrated that the control of break-point chlorination is best obtained by maintaining a residual past the break composed of 85% to 100% free chlorine. Break-point chlorination control thus resolves itself into a quantitative differentiation test between free chlorine and chloramine residuals. This control must be sufficiently adequate and accurate in its manipulation to indicate the presence of a residual composed of 85% to 100% free chlorine.

"Early in 1940 Mr. Laux of Anderson, Indiana, controlled this type of chlorination by adding chlorine to the water until an immediate or flash residual was obtained on addition of ortho-tolidine. Later, it was learned that this instantaneous color development represented free chlorine residual and any increase in the color thereafter represented chloramine residual. Thus, there came into existence a differential test for free chlorine and chloramines. In turn, it was pointed out that this could be made quantitative by reading the instantaneous color developed and the 100% color development after a contact of 5 minutes. The first reading represented quantitatively the amount of free chlo-

rine present and the difference between the two readings represent the amount of chloramine present.

"From a laboratory and comparative point of view the results, particularly in the case of low marginal residuals where chloramines may predominate, are not strictly accurate. This is due to the difficulty of standardizing the reading time following the addition of ortho-tolidine. For break-point control purposes, however, it is entirely adequate because control depends upon the production and maintenance of free chlorine to the near exclusion of chloramines. There is thus little need to determine the exact amount of each.

"Messrs. Hallinan and Gilcreas have standardized the reading time by applying sodium arsenite to the sample immediately after the addition of ortho-tolidine. This is excellent for residuals consisting mostly of chloramines, but for break-point chlorination control, where the residual is composed largely of free chlorine, the test can be made more sensitive by reading the residual immediately after the addition of the arsenite than by waiting the full five minutes as now directed.

"The value of their test for determination of false residuals due to manganese cannot be overestimated, for this is the first usable and accurate test yet developed for the purpose."

The Division of Laboratories and Research of the New York State Department of Health has prepared, for the use of the field staff of the department and certain waterworks operators, the following directions for carrying out the ortho-tolidine-arsenite test.

Determination of Residual Chlorine by the OTA Test

1. Select three 2-oz. French square bottles; mark one *A*, one *B*, and one *OT*.
 2. Add 50 ml. of a sample of chlorinated water to each of the three bottles.
 3. Unscrew, and fill droppers of both reagent bottles, one with ortho-tolidine, the other with arsenite.
 4. Hold samples for 10 minutes, the required period of contact. If the sample is cold, warm the portion marked *OT* to 60° F. in a bath of slightly warmer water or by holding it in the hand.
- All operations noted in paragraph 5 should be carried out as rapidly as possible. For each bottle, the addition of reagents and mixing should be completed within 10 to 15 seconds.*
5. Add a dropperful of ortho-tolidine to *OT*. Mix by one quick shake.
 - Add a dropperful of ortho-tolidine to *A*. Mix.
 - Add a dropperful of arsenite to *A*. Mix.
 - Add a dropperful of arsenite to *B*. Mix.
 - Add a dropperful of ortho-tolidine to *B*. Mix.

a. *Active residual chlorine*—Arrange as shown in Fig. 1, using portions *A* and *B*. Read 3 minutes after addition of the ortho-tolidine.

b. *False residual*—Read portion *B* alone 4 minutes after addition of ortho-tolidine. If sample is colored or turbid, use an untreated sample blank as in the usual ortho-tolidine test.

c. *Conventional OT test*—Read *OT* portion at 4½ minutes in the usual manner.

d. *Chloramine*—Rearrange bottles as shown in Fig. 2, using portions *OT* and *A*. Read at 5 minutes. If this reading exceeds 0.05 ppm, read again at 15 minutes to allow for the slower development of color due to chloramine. Read portion *OT* again just prior to the 15-minute chloramine reading.

	Read at*	
<i>A</i> minus <i>B</i>	3 min.	= active chlorine
<i>B</i>	4 min.	= false residual
<i>OT</i>	4½ and 14½ min.	= total chlorine and false residual
<i>OT</i> minus <i>A</i>	5 and 15 min.	= chloramine

*The chloramine reading must be made exactly at 5 minutes and at 15 minutes because of the changing color. For the same reason it is essential to read *B* just after *A* minus *B* and to read *OT* just before *OT* minus *A*. The actual timing for the other readings is suggested for convenience.

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New York City's Postwar Program

(Continued from page 21)

The Idlewild Airport

One of the illustrations shows a model of the Idlewild Airport, made for Jay Downer, the airport engineer. This shows 35 principal hangars, but the number actually constructed will depend upon the number of airlines that will use the field. According to Major Elmer Haslett, Director of Airports for the city, twelve lines have indicated their intention of using the airport (two of them listed as "probable"). He envisioned the Idlewild administration building as the central point in an airlines web eventually extending around the globe. It will contain a large assembly hall, a movie theatre, two large restaurants, and bars, banks, stores and scores of other concessions. There will be seven two-story extensions in the form of "loading fingers." The first floor of this building will contain passages for motor trucks, automobiles, platform-type trailers and other mechanical carriers, leading to the planes parked on a loading apron 3,500 to 3,800 ft. wide.

Parts of the field will be allotted for parking areas. Circumferential roads will surround the field passing the rears of the hangar areas. There will be three main divisions of hangar areas, one in the shape of two V's, another of one V. A seaplane base, marine air freight terminals and a marine administration building have been planned but not yet definitely adopted. Another tentative plan is for a "tank farm" for oil and gasoline, which could be unloaded from ocean-going tankers directly into the storage tanks. There is considerable doubt that this feature will be developed.

The airport will have its own fire department, with several stations manned by air-minded firemen.

The plan includes 9 miles of concrete runways 12" thick, 5.6 miles of concrete taxiways, and 306 acres of level concrete area including the central apron. The six runways are so located as to cut interference between planes to a minimum and permit their operation with railroad precision regardless of weather. There will be two runways 10,000 ft. long, one 8,200 ft., one 7,500 ft., one 6,500 ft., and one 6,000 ft. All will be 200 ft. wide. The taxi strips will be 100 ft. wide.



Chart showing time it will take to reach Idlewild airport (lower right) by auto from principal areas of New York City.

The first to be constructed will be one of the 10,000 ft. lanes, the 8,200 ft. and the 7,500 ft. The initial contract for these was let to the A. I. Savin Construction Co. of East Hartford, Conn., for \$2,203,945, and it is expected that these and the intersecting taxi strips will be finished in 1945, the 10,000 ft. runway to be ready for planes next spring. The cost of runways, including filling, draining, paving and incidentals, is estimated to be between \$30,000,000 and \$45,000,000—possibly more.

With the six runways operating, it will be possible for two planes to land or take off simultaneously, or at the rate of one a minute. Area is available for the ultimate construction of six more runways, doubling the capacity. LaGuardia Field is now operating at a rate of about 450 flights a day, and it is expected that the total capacity of these and other airports in New York City will permit 360 flight movements an hour.

Said Airport Engineer Downer: "The runways at Idlewild have been planned to meet the needs of planes weighing up to 300,000 pounds. The largest plane now weighs about 90,000 pounds. The runways can be built before the end of the war because they do not require critical materials, but probably not the steel administration and control building.

"At a field where the traffic will be far greater than anything known now, traffic control will be a new problem. Radar will be necessary for blind landings, certainly. The airlines are confident they will be able to maintain their schedules regardless of weather conditions."

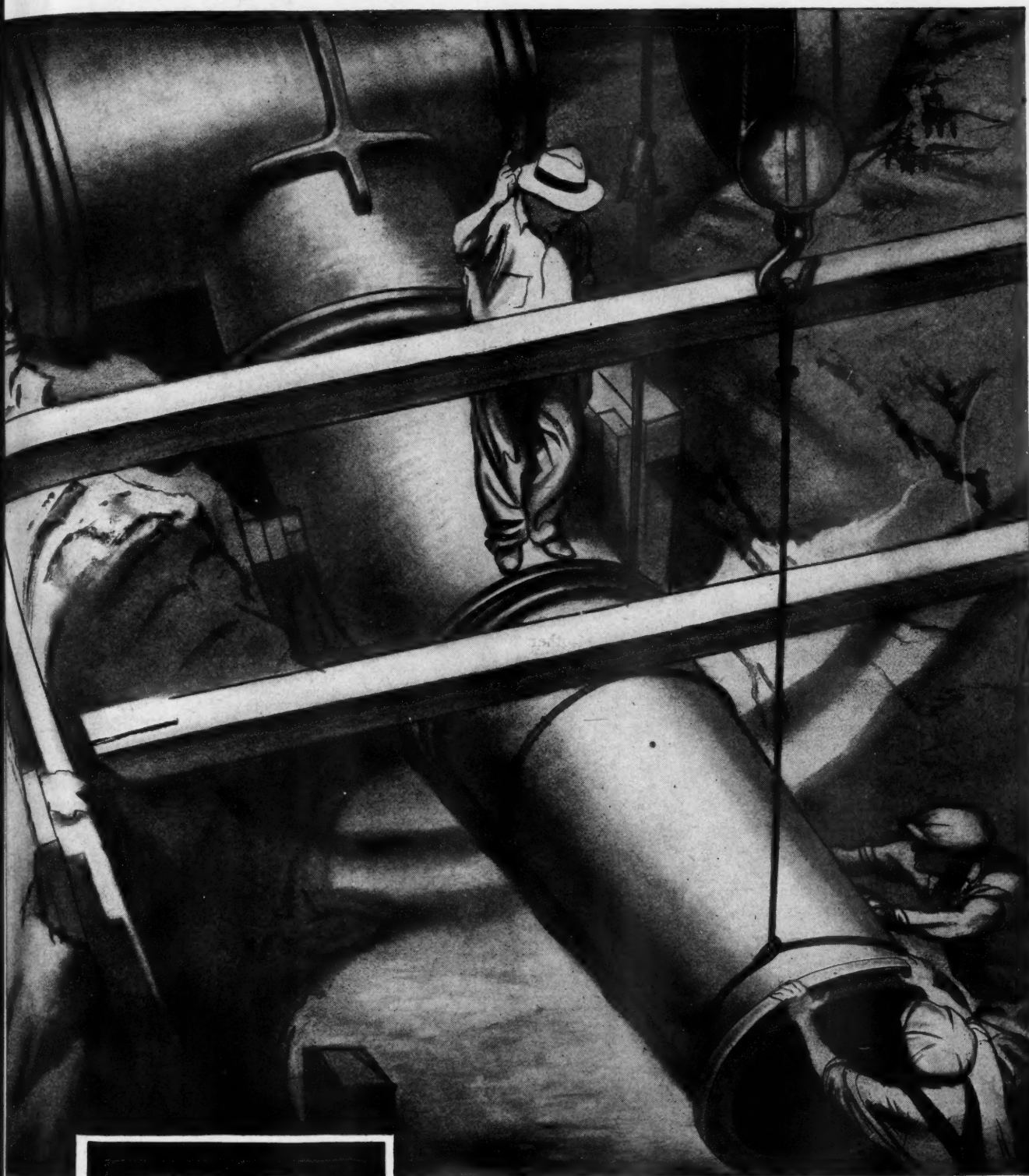
It is believed the new runways will be more than ample to care easily for the type of post-war craft now on order by most airlines—huge four-motored transports with tricycle landing gear, with normal operating speeds around 300 miles an hour and capable of taking from 40 to 60 persons per plane anywhere on the globe in about 60 hours of flying time. The next important step-up is expected to be to 200,000-pound aircraft accommodating more than 100 passengers. By the time these planes are ready, Idlewild will be ready, too.

At present the site is being cleared of buildings, many of them fishermen's huts on stilts over shallow water and other shacks. Hydraulic dredges in Jamaica Bay are pumping hydraulic fill onto the 4,056-acre site, many parts of which are below sea level at high tide. Forms are being set for the 10,000-ft. runway so that the 12" concrete can be poured before freezing weather.

Some 32,500,000 cu. yd. of fill have been pumped from the bay bottom, the sand and other solids being suspended in about five times their volume of water, which drains back into the bay. The total fill needed is estimated at about 45,000,000 cu. yd.

It is not proposed to build the \$7,500,000 administration building at once. Instead, a \$150,000 temporary structure, placed behind the site of the eventual building and constructed with some form of composition board, will house only the most essential offices, utilities and public service concessions.

Revenues for operating the airport are expected not only from the airlines using the field but also from numerous concessions, profits from city operation of the large parking area facing the administration building, and rental of offices. It is proposed to lease out the taxi service to the airport and the bus service connecting the distantly separated hangar areas. Another suggested source of revenue is the construction of two fruit and vegetable markets, or merchandise terminals,



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bordering the parking section. These would be heated in winter and cooled in summer, and normally ripened lettuce from Florida, artichokes from California and other products of more distant tropical area, could be flown there in a few hours.

Tunneling Mains Under Railroad Tracks

(Continued from page 15)

every hour was an aid in relieving fatigue. After the round hole had been dug about 1½ to 2 feet, the man stayed in the culvert while two other men jacked it into the hole. The hardness of the rock varied and we considered it good work if the men took out 10 feet in 24 hours. The 100-Watt light created heat in the hole and the men were perspiring constantly. At one place under the tracks, we struck a small spring and we used our Homelite gasoline pump to take care of this water. Our men stuck to the job, starting at 7:00 o'clock Monday morning and completed it on Saturday afternoon about 6:00 o'clock. During this work, careful measurements were made and checked for direction and level and, when the job was completed, it had not varied more than an inch. Moreover, looking along the top and sides of the culvert, while the work was progressing, you could not see more than a mere crack of light—indicating that there was very little excess rock removed. To date, the railroad bed has not settled a bit and no refilling of the street has been necessary.

After the culvert was in place, our men laid the 8" mains in the large open hole, poured the joints, and carefully skidded these mains into the culvert pipe. Eighth bends were placed on each end of the 8" mains and the pipe was brought to the proper level. Valves were placed on each side of the tracks and the pipe tested for leaks. After blocking each end of the culvert with a stone wall, we filled and air tamped the large hole. When the 8" mains were run past the war plant, it was an easy matter to connect with this pipe at both ends.

If our men had not shown loyalty and determination, the many difficulties would have slowed the job considerably. Since this job was completed, we have made two other similar main line railroad crossings and the Railroad Company seems satisfied.

Bypassing a Difficult Sewer Construction Job

(Continued from page 23)

A Chicago Pump Co. automatic sump pump with float switch keeps the pump chamber dry. A ventilating fan or blower was included in the plans, but a high enough priority for its purchase could not be secured so it has not been installed. However, the steel sash windows are left open and a decided draft is felt at the bottom of the pump chamber, so it is felt that the blower is not absolutely necessary. However, it will be installed as soon as possible as a safety measure.

As already described, there is an overflow between the intercepting manhole and the by-pass manhole at a level that will prevent damage to the pumps from any backed up sewage, should they for any reason stop too long. There is a manhole on the by-pass line

every 430 feet between the pump station on Church St. and the manhole at McKay St. where the by-pass ends. The sewer line that is replaced by the by-pass is plugged at each end and the services that had been connected to it were moved to the by-pass.

An 8-inch line formerly connected into the interceptor on Hagerman St. had to be changed into the by-pass and an additional manhole was built at this point.

So far no trouble has developed with this installation; the level of sewage in manholes above the lift station has lowered five feet and the sand in the sewer below the break has been eliminated.

The lift station requires 600 to 650 kwh per month. One man checks it every day and so far has had nothing of any consequence to do to keep it operating.

Waterborne Disposal of House Refuse

IN A PAPER before the Royal Sanitary Institute, Herbert J. Manzoni, city engineer and surveyor of Birmingham, England, described briefly as follows the Garchey system, which has attracted some attention recently in this country.

"In recent years the Garchey system of waterborne disposal of solid refuse from houses has been tried in this country, but it results in an extra cost, it adds a further use of water in considerable quantities, and it is very doubtful whether any considerable spread of the system is likely. The trial plant was built in connection with the Quarry Hill Flats in Leeds, where other rather unorthodox methods of buildings were incorporated, and there is no doubt that the result of this very bold experiment is good and reflects great credit upon the authority and their responsible officers.

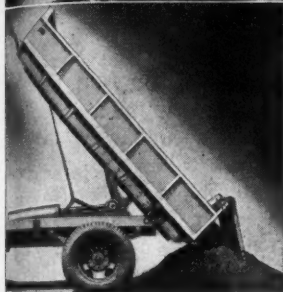
"The Garchey plant embodies a large sink in each flat, down which solid refuse contained in paper wrapping is swilled with water, and it passes down large diameter pipes into an underground sump. This sump is a collecting receptacle for a large number of the dwellings, and from there the refuse is drawn by suction into an incinerator, dewatered and burnt, and at Leeds the heat generated is used to supply hot water and steam for a communal laundry. It would appear that combined with a comprehensive scheme of high density flat building it has certain advantages, but it seems extremely difficult to apply it to low density building or to the varied types of buildings in any ordinary urban development, and consequently it cannot be looked upon as a method which will eventually supersede present practice."

In further discussion of the subject of refuse disposal, Mr. Manzoni said:

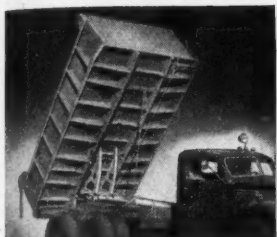
"Disposal of refuse by the street to street emptying of bins and the present method of central incineration cannot be considered ideal—it has many serious drawbacks, dust and dirt, high cost, and a considerable amount of rather objectionable labor are among them. An ideal system would be some form of simple decomposition on the site and eventual disposal *via* the drains, but the nature of commercial and domestic solid refuse is such that this would probably be a complicated chemical process. The use of household incinerators is quite feasible, but this still leaves the problem of disposal of ashes, and involves a certain amount of additional domestic labor which in these times cannot be considered desirable."



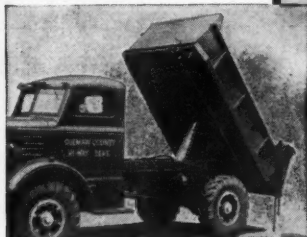
1. Direct-Lift Hoist. Body has Trussed Understructure. Exclusive feature.



2. Cam and Roller Hoist for long wheelbase chassis. High ground clearance for piling.



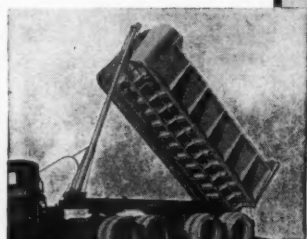
3. Typical installation for Six Wheelers.



4. Telescopic Hoist. Heavy-Duty Body.



5. Dual Telescopic Hoist and Rock Body. Down Folding Gate.



6. Vertical Telescopic Hoist for long Bodies.



7. Tanks for all types of liquids.



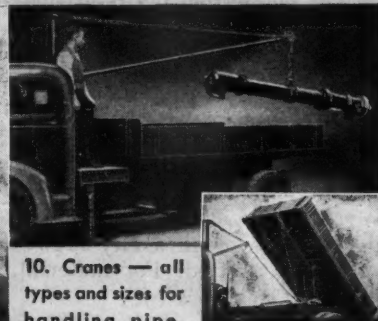
8. Street Flushers and Sprinklers.

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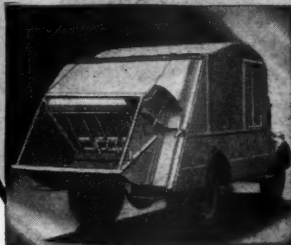
11. Crane with Winch and Dump Body.

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Protecting A Reservoir From Surface Wash

How a reservoir in a California canyon was protected from damage threatened by the runoff from heavy rainstorms.

By JOSEPH T. SWANSON

Superintendent of Water and Streets, Sierra Madre, Calif.

SIERRA MADRE, Calif., a town of 5,000 population, obtains its water supply from a reservoir with a capacity of 431,596 gallons located in Auburn Canyon at an elevation of 1300 feet. This was built in 1928.

No trouble was experienced until a heavy rainstorm on January 22 and 23, 1943, when there was a precipitation of 7.50 inches the former day and 8.60 the latter. This caused a slippage of the brush cover on different parts of the high slopes back of the reservoir and a stream of water poured down the canyon and started cutting a deep channel on one side of the reservoir. The main from the reservoir crosses at the point where the cutting was made and when we arrived we found the main exposed and taking a terrific beating with large rocks and boulders. It seemed imperative that we replace cover over the main and protect it from similar hazard in the future by providing a channel for carrying floods past the reservoir.

Funds for large projects are very limited for a town of this size and labor was unobtainable at this time. However, with a city crew of five men a rock channel was started. For material, an abundance of rock was found close by.

The channel was made 15 ft. wide with walls 5 ft. high, and approximately 300 ft. long. The floor and walls were made 14 in. thick of rock laid in cement

mortar. The east wall ties into the reservoir and the west wall ties into a rock ledge on the mountain side. There is a cut-off wall 6 ft. deep at the upper end so that water cannot cut under the channel floor.

This channel does not protect the property below, which is built up with large homes, but it does protect the reservoir. The job was completed before the rainy season of this year and has already proved its efficiency. The cost of the construction was \$1680.

Chicago's Refuse Disposal Problem

The officials of the Bureau of Streets and Electricity of Chicago, Ill., are making a thorough study of the problem of disposing of the refuse of that city. According to a preliminary report recently submitted to Mayor Edward J. Kelly by Commissioner Lloyd M. Johnson, the cost of disposal of 2,929,527 cubic yards of mixed refuse delivered to contractors in 1942 was \$813,700 or \$0.2779 per cu. yd. In addition, 519,162 cu. yds. were dumped without charge other than dump maintenance. All refuse collected by city forces and private scavengers is disposed of by dumping in clay pits, quarry holes, or in low ground.

At four open dumps, the city has contracted with the owners for the privilege of dumping at a specified price per cubic yard. Railroad loading stations are maintained at four other points, where contractors load the material into railroad cars and transport it to the dump site. The city owns and operates one large dumping area.

On the basis of available data, the report concludes that the controlled open dump or sanitary land-fill provides the city with the most economical method of disposing of its refuse for the immediate future. It is pointed out that with the development of adequate specifications for the maintenance and preparation of disposal sites, and with the proper control of contract operations, available dumping areas could be reclaimed for useful purposes, without the creation of nuisances. The installation of scales for the weighing of refuse, and the construction of modern sanitary railroad loading stations are recommended. The preparation of plans and specifications for an incinerator for construction in any area where dump sites are not available or where the length of haul becomes excessive was also suggested.

Total city collection costs for 1944 are estimated to be \$3,556,850, or \$1.15 per cubic yard, for seven-day service. Conveyor loaders, pneumatic tired trailers, dump trucks, enclosed body trucks of short wheelbase, and specially designed trucks of open type design with drop side doors are utilized by the Bureau of Streets and Electricity. The aggregate capacity of all the city trucks is 11,940 cubic yards per day, with some of the equipment operating two shifts per day. The purchase of additional equipment is contemplated, according to the report.—*News Letter of American Public Works Ass'n.*



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Thomas F. Wolfe, Engineer, Peoples Gas Building, Chicago, Ill.

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Planning High-Rate Filters

Standards adopted by the State Health Departments of Wisconsin, Minnesota and Iowa, superseding those previously adopted, to be followed in preparing plans for plants in those states.

THE Board of State Health Commissioners of the Upper Mississippi River Basin Sanitation Agreement, including the health departments of Wisconsin, Minnesota and Iowa, adopted this year tentative standards, based on observations and tests at demonstration plants, which should be followed in preparing, for review by those departments, plans for plants for treating domestic sewage, which may include limited amounts of industrial wastes amenable to biological treatment.

Three types are considered. Type A includes filters "used with conventional primary settling tanks and sludge digestion units where effluents of not less than 30 ppm five-day BOD are required."

Type B includes "filter installations used after fine screens with undigested sludge disposal."

Type C are "sewage filters (roughing filters) designed for pre-treatment of unusually strong sewage capable of treatment by biological methods."

Type A filters "may be designed for rates from a minimum of ten million gallons per acre per 24 hours to a maximum of thirty million gallons per acre per 24 hours."

"In comparing effluents from high-rate filters with effluents from conventional filters, all available oxygen, including nitrite-nitrate oxygen, shall be considered. Well nitrified effluents from conventional filters with BOD in the magnitude of 50 to 60 ppm may be considered equivalent to effluents from a high-rate filter with 30 ppm.

"1. The settling tank preceding the filter should be designed with an overflow rate not in excess of 1,200 gallons per square foot of surface area per 24 hours for the period of maximum dry-weather flow of one hour duration.

"2. A controlled recirculation system should be provided:

"a. To maintain continuous dosing at a rate always equal to or in excess of ten million gallons per acre per 24 hours.

"b. To supply sufficient dilution to the settled sewage so that the five-day biochemical oxygen demand of the influent to the filter, recirculation included, shall not exceed three times the five-day BOD of the required effluent, providing that, in no event, shall the loading; recirculation included, exceed three-fourths pound five-day BOD per square foot of filter surface per 24 hours.

"3. The distribution system should provide continuous discharge onto the filter, and the rest period during which any unit area receives no sewage should not be in excess of 8 seconds. The distributor should be designed to meet the following requirements:

	Average	Flow Maximum	Minimum
Minimum coefficient of area*.....	0.96	0.96	0.96
Maximum coefficient of distribution*.....	1.65	2.0	2.0
Maximum dosing ratio*.....	2.00	2.0	2.0

*The "Coefficient of area" is the ratio of that filter surface receiving sewage to the total filter surface area.

The "Coefficient of distribution" is the sum of those filter areas, expressed in percent of the filter surface receiving sewage, on which the flow deviates from the average dosing rate by 100% or more, 75% or more, 50% or more, 25% or more, or 0% or more, this sum divided by 100.

The "Dosing ratio" is the maximum dosing rate on any unit area of the filter, divided by the average dosing rate on that area of the filter receiving sewage.

"4. The filter media in place should be clean, hard, durable crushed rock, gravel or its equivalent. Where stone is used, it should be so graded that none will pass a two-inch screen, and none will be retained on a four-inch screen. To that extent the stone should have all three diametrical axes approximately the same length. The minimum depth of filter media should be six feet.

"5. The filter underdrainage system should be of such capacity:

"a. That when carrying maximum discharge, the flow will not occupy more than one-third of its vertical cross-section area.

"b. That the minimum total unsubmerged outlet area should be equal to at least five per cent of that of the filter surface.

"6. The settling tanks following the filter should be so designed that the overflow rate per square foot of water surface per 24 hours does not exceed 600 gallons at the maximum flow into the tank.

"7. Facilities for conditioning and digesting should be designed with special attention to the quantity and characteristics of the sludge produced.

"8. All five-day BOD determinations specified herein are to be made on samples collected at not greater than hourly intervals, and composited volumetrically in proportion to the flow. Sampling should start in the early morning before strong sewage or waste arrives at the plant, and be continued for 24 hours.

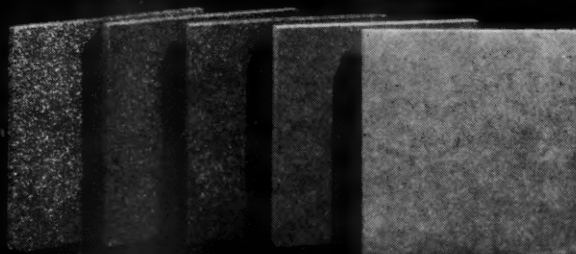
"9. Devices should be provided to permit measurement of:

"a. Flow of raw sewage or plant effluent.

"b. Flow to filter, or recirculated effluent, whenever recirculation is used.

"10. Tests of distribution of flows onto the filter should be made by a series of adjacent pans consisting of water-tight compartments 6 inches by 12 inches in plan. These pans should be placed along an entire radius of the filter, with the 12-inch length perpendicular to that radius. The flow discharged against the 12-inch section of the filter wall should be drained into the end pan. With armed distributors, the duration of the test shall be any whole number of revolutions. Where

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TABLE 1.—Effect of Recirculation Ratio and Strength of Settled Raw Sewage on High-Rate Filter Plant Effluent

Average Daily Recirculation		Average B.O.D. of Settled Raw Sewage										
Dosing Rate	Ratio	Raw Sewage mgad	Ratio	100	150	200	250	300	350	400	450	500
10	10.0	0.0	44	62	79	95	112	129	147	164	181	
	6.67	0.5	37	50	63	76	89	101	113	126	139	
	5.0	1.0	33	43	53	64	74	84	94	105	115	
	4.0	1.5	30	39	47	56	64	73	82	90	99	
	3.33	2.0	—	35	43	50	57	65	72	80	87	
	2.86	2.5	—	33	40	46	52	59	65	72	78	
	2.50	3.0	—	31	37	43	48	54	60	67	74	
15	15.0	0.0	41	58	75	92	109	128	158	201	248	
	10.0	0.5	32	46	59	72	85	98	111	124	145	
	7.5	1.0	—	39	49	60	70	80	91	101	111	
	6.0	1.5	—	35	43	52	60	69	77	85	94	
	5.0	2.0	—	31	38	45	53	60	68	75	82	
	4.29	2.5	—	—	35	42	48	55	61	67	73	
	3.75	3.0	—	—	32	38	44	50	55	61	66	
20	20.0	0.0	39	56	73	90	119	162	210	257	305	
	13.33	0.5	32	44	57	70	83	97	125	167	214	
	10.0	1.0	—	37	47	58	68	78	88	104	131	
	8.0	1.5	—	32	41	49	58	67	76	84	93	
	6.67	2.0	—	—	36	43	51	58	65	72	79	
	5.72	2.5	—	—	32	39	46	52	58	65	71	
	5.0	3.0	—	—	30	36	42	48	53	59	64	
25	25.0	0.0	38	55	72	103	148	196	244	—	—	
	16.67	0.5	30	42	56	69	87	125	171	218	—	
	12.5	1.0	—	36	46	57	67	79	105	147	193	
	10.0	1.5	—	31	40	49	57	66	75	91	125	
	8.33	2.0	—	—	36	42	50	57	64	72	83	
	7.15	2.5	—	—	31	38	44	51	57	63	70	
	6.25	3.0	—	—	—	35	40	46	51	57	63	

Note:

For design purposes, first estimate the reduction in B.O.D. of the raw sewage through the primary clarifier, then apply data from above table.

Generally speaking, the formula shall not be applied to loadings or recirculation ratios in excess of those included in the above table.

Example:

Assumed B.O.D. of raw sewage = 300 p.p.m.
Reduction in primary clarifier (33% assumed) = 100 p.p.m.

Strength of settled raw sewage = 200 p.p.m.

The following are solutions from the above table:

- (1) For dosing rate of 15 m.g.a.d. and 0.0 recirculation, the plant effluent is estimated to have a strength of 75 p.p.m.
- (2) For dosing rate of 15 m.g.a.d. and recirculation ratio of 2.0, the plant effluent is estimated to have a strength of 38 p.p.m.
- (3) To obtain a plant effluent of 30 p.p.m., it is necessary to use a recirculation ratio of 3.0 and a dosing rate of at least 20 m.g.a.d.

disc distributors are used, tests should be made along two radii approximately 90 degrees apart. Where feasible, the tops of the pans should be flush with the surface of the filter media."

Type B Plants

The requirements for Type A apply to Type B except as follows: Unless otherwise demonstrated, the reduction in 5-day BOD accomplished by fine screens should not be considered to exceed 10%.

The solids removed by the screen and by the final settling tank should be disposed of in such manner as to be inoffensive, and safe from a public health standpoint.

The 5-day BOD of the filter influent, recirculation included, should not exceed 3 1/3 times the 5-day BOD of the required effluent.

Type C Plants

The requirements for Type A apply to Type C except as follows: The settling tank preceding the filter should be designed with an overflow rate not in excess of 1,200 gal. per sq. ft. of surface area per 24 hr. for maximum dry-weather flow of one hour duration.

Filter loadings in excess of 0.75 lb. of 5-day BOD per sq. ft. of filter surface per 24 hr. may be used. The reduction in 5-day BOD by filtration and subsequent settling may be assumed to be 64%, provided that no

reduction in excess of 0.7 lb. per sq. ft. of filter should be assumed.

The intermediate settling tank should be designed to have an overflow rate not greater than 1,200 gal. per sq. ft. of water surface per 24 hr.

Forced draft ventilation should be used to provide one cu. ft. of air per minute per sq. ft. of filter surface whenever filter loading exceeds 0.75 lb. of 5-day BOD per sq. ft. per 24 hr.

Municipality's Liability for Accident Due to Projecting Water Meter Boxes

In Boston, Massachusetts, a pedestrian on a graveled sidewalk struck her foot against a water meter cover, fell and was injured. She sued the city, not under the statute requiring the city to keep its highways in repair (which would have required notice to the city of the time, place and cause of the injury, not given within the stated period) but in a common law action. She contended that since the city, through its water department, operated an enterprise commercial in character, it was liable at common law for her injuries.

The Massachusetts Supreme Court, however (Lucas v. City of Boston, 48 N. E. 2d 6), found no evidence to indicate that the meter cover, though installed and maintained by and under the control of the city's water department as a commercial enterprise, was not a proper one, or was not originally properly installed by the water department, or that, at the time of the plaintiff's fall, the cover was not in the same condition and in the same position it was in at the time of its installation.

The cover, two feet long and one foot wide, was in the center of the sidewalk, which was six feet wide, with no curbing. One corner of the cover protruded three inches above the surrounding sidewalk where the ground had been washed away. This condition had been in existence four months before the accident.

The liability of the city at common law, it was held, was "for neglect in the construction of works" commercial in character and undertaken for a profit. The ground of action was not the defect in the road but defect in the waterworks. There was no defect in the waterworks. Though the evidence might warrant a finding of neglect of the city to keep the sidewalk adjacent to the meter cover in repair as required by the statute, a recovery could not be had on that ground in an action at common law."

In Tennessee recovery was denied for injuries sustained when the plaintiff, a pedestrian, stumbled over a city water meter box projecting above the pavement "about an inch."

A municipal corporation is not chargeable with negligence when an accident, not likely to happen according to common experience, occurs because of slight defect in the sidewalk or street, from which danger was not reasonably to be anticipated as likely to happen. (Forrester v. City of Nashville, Tennessee Supreme Court, 169 S. W. 2d 860.)

"Probability, not possibility, governs," the court said; "that it is 'possible' for some one out of many to trip over so slight a projection in the sidewalk as is here involved does not make it dangerous."

The accident happened about 9 a.m. November 8. The fact that the plaintiff was proceeding "with his head

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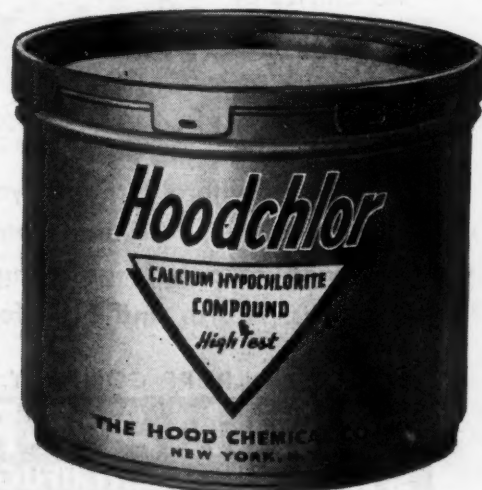
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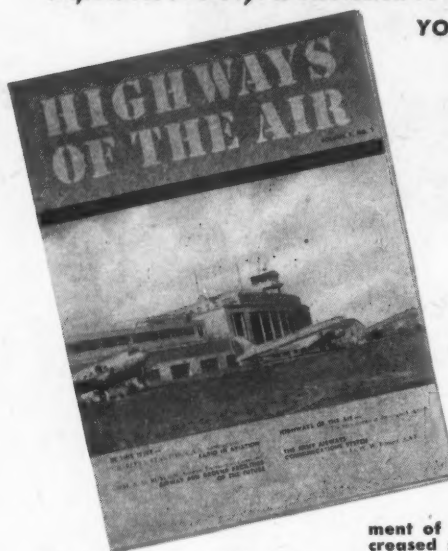
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YOU SHOULD KNOW —

What is the "bottle-neck" in post-war expansion of civil aviation . . . See page 8

Why CAA is installing Ultra High Frequency radio ranges. See page 8

What anti-collision devices are being developed . . . See page 9

What electronic aircraft detectors are. See page 9

What can civil aviation learn from the A.A.C.S. See page 2

What goes into an instrument landing system . . . See page 11

What is approach control . . . See page 11

These questions and dozens of others of vital import to all those interested in the development of radio in aviation for increased safety of human life and property are discussed in the pages of

"HIGHWAYS OF THE AIR"



This issue is No. 1, Volume 1 — others will follow if you request them. Contents are authoritative—but non-technical—designed to inform the layman on a subject which is becoming of increasing importance.

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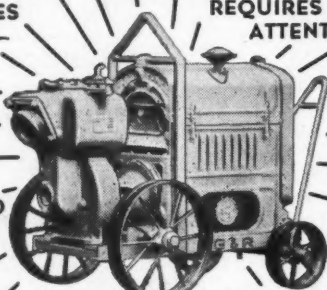
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bowed in the face of a north wind driving a light snow" did not add anything to the city's responsibility because of the slight projection of the water meter box. The wind and driving snow did not relieve the plaintiff from the exercise of ordinary care for his own safety but rather called for that degree of ordinary care exercised under such conditions."

Avoiding Grade Crossings by Elevated Highways and Subways

City roadways are usually on the surface, but for certain reasons—usually to avoid crossing at grade—may be above the surface or under it. Discussing the use of the three—elevated highways, surface highways and subways—"Roads and Road Construction" defines elevated highways as roads whose height above the surface road system permits vehicles traveling on the latter to pass beneath, and subways as being constructed at sufficient depth to carry the traffic under the surface system if necessary. Subways may be open or closed, but the term is reserved for relatively shallow structures. Surface highways can be made adequate for fast, dense urban traffic only if they include service roads for local traffic and provide lateral access at a limited number of (fly-over) junctions. The total width required is rarely available in cities, and congestion is increased by the presence of shops, business premises and omnibus stops on the main traffic routes. The construction of new radial routes is regarded as preferable to the reconstruction of existing main roads. Surface roads of this type would necessarily divide property and necessitate the blocking of many existing roads. These objections do not apply to elevated highways or subways. The elevated highway does not interfere with existing road systems, is free from level intersections, and provides limited access only; it is preferable to the subway because it is open to air and light, and its construction entails little disturbance of underground supply and drainage mains or of buildings. Its disadvantages include noise, creation of the feeling of a barrier to those at ground level, and the possible ugliness of the structure. The subway is free from intersections or traffic delays; access is limited; and the structure and the vehicles using it are concealed. Noise, though considerable within the subway, is relatively slight outside it. Its disadvantages include serious interference with underground supply and drainage mains, and difficulties of construction and the possible danger of floods where the ground-water level is high.

City's Rights in Disposal of Storm Water

A city in the disposal of its storm water has the same right as an individual would have with reference to surface waters. And where the city, as upper proprietor, does no more than collect in a ditch the surface water, maintaining its natural course, although the surface water so collected and passed along in the ditch no longer is spread over the surface, the city, as with an individual upper proprietor, has committed no legal wrong of which a lower proprietor with land abutting on the ditch can complain or upon which he can maintain an action. And the rights of the parties are not changed merely because the city has grown and has installed a storm sewer system as being more practical than an open ditch or creek.

This doctrine was applied in *Freeman v. City of Lake Mills*, 243 Wis. 537, 11 N.W. 2d 181, where it was held that the defendant city, whose storm sewer discharged surface water into a creek which ran past a lower proprietor's land was not liable in damages because the surface of the creek water rose to above the outlet to the plaintiff's tile drain causing a flow into plaintiff's basement and seepage through the ground from the stream to the basement, the established evidence showing that the change in the channel of the creek and consequent raising of the water was a natural process for which no legal liability could be placed upon the city.

Flooding Damage Due to Sewer Trench

The Massachusetts courts hold that a municipality which voluntarily avails itself of its power to construct and operate a sewer system for the benefit of abutters who pay the city through assessments, becomes liable for the negligence of those whom it employs to carry on the enterprise, who for this purpose are treated as its agents, even though the same persons may be public officers and not agents of the city with respect to other municipal functions.

The Massachusetts Supreme Court (*Galluzzia v. City of Beverly*, 309 Mass. 135, 34 N. E. 2d 492) in an action for flooding a cellar, allegedly by the negligence of a sewer crew breaking through the cellar wall, rejected the defendant's contention that it was not liable because, after its sewer department had filled the trench it had dug, the condition of the street surface became a matter of street maintenance, that

the city's duty was to keep the way reasonably safe and convenient for travelers.

The macadam had not been restored, because it was desired to allow the filling of the trench to settle further. An unusual and extraordinary rainfall caused water to enter the trench and flow through the breaks in the wall into the plaintiff's cellar. The court held that the decisive element in the case was that the entire job of digging the trench, laying the connecting pipe and replacing the street surface was throughout an integral part of the defendant's construction and operation of its sewer system. Judgment for defendant was therefore reversed and directed for the plaintiff.

Contract Limitation Statutes Do Not Apply to Sewer Assessments

An assessment by a city for special benefits in connection with the construction of a storm sewer is an exercise of the taxing power and, in a general sense, a tax. An action to recover such an assessment is not an action on an implied contract, so that statutes of limitation applicable to contract actions do not apply. Such assessments are enforced proportional contributions of a special kind, made unwillingly, by virtue of legislative authority conferred upon the municipality for that purpose, upon such terms and conditions as the legislature, within constitutional limits, sees fit to impose. The power thus conferred is essentially a power to tax; its exercise in the mode prescribed is a species of taxation; and the sums raised by such exercise are taxes and are always treated as such. *City of Bridgeport v. Schwarz Bros. Co.*, Connecticut Supreme Court of Errors, 37 A. 2d 693.

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Street Lighting: A Review and Summary of Trends*

FROM 1932 to 1942, street lighting differed in three respects from every other field of lighting: (1) Street lighting was the only form of lighting for which the public spent more money in 1932 than in 1942. The figures were \$1.30 per capita and \$0.99 per capita, respectively. The expenditure should be about \$2.50 per capita to give the public an optimum balance between lighting cost and lighting benefits—public safety, traffic facility, and so forth. (2) Street lighting was the only form of lighting for which there was no significant advance in kilowatt-hours used—it was about 2.3 billion kilowatt-hours in 1931 and is about 2.1 billion kilowatt-hours per year now. It should be about 10 billions. (3) The third item is closely related to the first two. Street lighting was the only form of lighting in which rate reductions were not followed by sufficient increase in use to regain the former dollar volume, or more.

These three items were effects. The cause might be stated in various ways, but the author calls it "Lack of attention."

Recent Trends. The public is showing more interest in street lighting than ever before. This is particularly true in the coastal areas where the dimout took its toll. Civic organizations, such as the Junior Chamber of Commerce, have found that they can get city

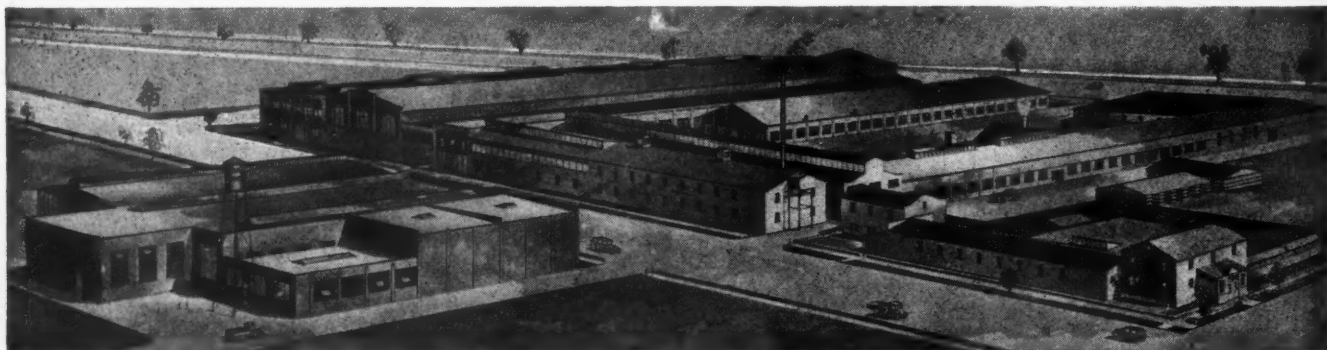
*By Kirk M. Reid, Nela Park Engineering Division. The Magazine of Light, No. 3, 1944. Highway Research Abstracts.

officials to take action on street lighting. They expect to resume this activity as soon as it can be carried on effectively.

Many utility executives have recently been going on record to the effect that their street lighting must be good because it has become a very important factor in public relations. Now they are disposed to approve practices utility engineers have long wanted to follow, particularly in two respects: modern luminaires properly used, and rate rationalization.

The manufacturers' group is also active on this development.

Luminaires. What luminaires will be used in post-victory projects? On arterial streets, the types of luminaires which represented the best modern practice before the war will continue to represent the best modern practice. Here are samples: 1. On heavy traffic arteries, the Form 81 type of unit—with 10,000-lumen and 15,000-lumen lamps. These are normally used with internal deflectors to direct more light to the pavement. They may be used without the deflectors where business establishments line the artery and it is desirable to have more light on the wide sidewalks and building fronts. 2. On light and medium traffic arteries, the Form 79 type of unit—usually with 6000-lumen or 4000-lumen lamps. Internal deflectors are to be desired for the most part on streets of normal width. Globes employing prismatic refraction pro-



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vide higher utilization efficiency on the narrower streets.

These types of luminaries are the answer on nearly all arteries. Mercury and sodium lighting has unusual value, as recognized, under special conditions. But for general use, it is significant that over 300,000 of the Form 81 and Form 79 types of units were put in before the war stopped modernization programs. These units are doing an excellent job.

On local traffic streets there will be one and probably two or three new items of equipment. There is a widespread conviction that enough money is not at all likely to be available to permit spacing much less than 300 feet on local traffic streets. Just before the war, comprehensive studies were completed and a new luminaire developed for use at approximately 300-foot spacings and at mounting heights of 25 to 30 feet. The city of Detroit, which cooperated throughout this development, was about the only one to get an order through, for a few hundred, before the lid was put on production. This is the unit—known as the Form 79 VR—for 6000-lumen, 4000-lumen, and perhaps in some cases for 2500-lumen lamps. The refractor bowl limits the amount of light delivered beyond the sidewalks, and directs a substantial proportion of light at wide angles up and down the streets. That means high utilization efficiency. It also means glare. But keep in mind that on local traffic streets, for which this luminaire was designed, there are seldom more than two or three units in the field of view. Street Lighting Evaluator measurements show that under these conditions this development represents a radical advance in lighting effectiveness over any former practice.

Fluorescent Street Lighting. The question has been raised in many quarters as to whether fluorescent lamps will not play an increasingly important role in street lighting after the war. In summary of the findings to date, fluorescent lamps have several advantages and also several disadvantages for street lighting. The advantages include high efficiency of light generation, low brightness, relatively long life, and enhanced visibility on wet pavements due to broad streaks of brightness from an elongated source. The disadvantages include inherently low light output per foot of source, large size of luminaires, and necessity of jacketing in cold weather. Over-all, fluorescent street lighting is thus far at a marked disadvantage, as compared with present sources and practices, in visibility obtained per dollar of total lighting cost.

Total street lights in the United States—nearly 4,000,000

<i>Illuminants</i>	<i>Per Cent of Total</i>	<i>Average Lumens</i>
Gas	1.5	400
Arco	1	8,000
Incandescent Filament	97	2,500
Sodium	0.5	10,000
Mercury	*	16,000

*Now a small fraction of 1%, but widespread interest indicates greater use post-victory.

Estimates of street lighting service for optimum balance between lighting cost and lighting benefits, as compared with present practice.

	<i>Now</i>	<i>Optimum</i>
Expenditure per capita, average	\$1.00	\$2.50
Number of street lights, millions	4	7
Kilowatt-hours per year, billions	2.2	10
Lamps per year, millions	6	10
Average lamp lumens	2500	7500

Luminaires—
Modern effective types, millions

0.3

7

Ornamental types, approximately used, millions

0.1*

0.1

*Many additional ornamental luminaires are now employed where the requirements would best be met by effective utilitarian types.

Here is the Kettle that will keep Post War roads, streets and airport runways in better shape. The 84-HD Kettle is the fastest heating and producing unit due to the patented features, "Double Heat Circulation System" and "Screened Reservoir." "Double Heat Circulation System" utilizes all the heat from the burner; "Screened Reservoir" makes it possible to draw off materials continuously. For the best in Road Maintenance Kettles, it's a Littleford 84-HD. Have one available for Post War work.

84-HD MAINTENANCE KETTLE

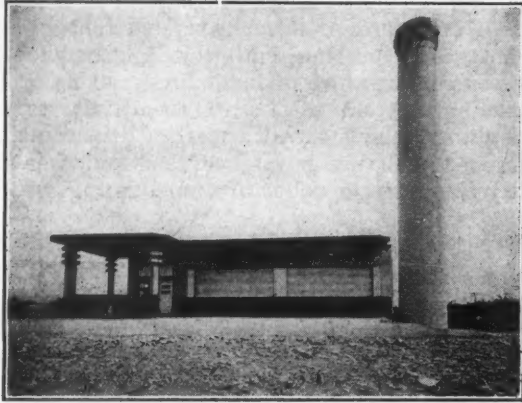


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Odor From Disposal Plant Not a Permanent Nuisance

Where injury to property is caused by odors from a sewage disposal plant, the right of recovery is limited to temporary or continuing damages. (*Wesley v. City of Waterloo*, Iowa Supreme Court, 8 N.W. 2d 430.)

In an action for damages from the operation of a disposal plant alleged to create sickening odors, it was held, following the rule laid down by the Iowa Supreme Court in its most recently considered case of *Ryan v. City of Emmetsburg*, 4 N.W. 2d 435 (a case almost parallel in its facts with this) that the plaintiff should not be allowed to recover for original or permanent injury, that is, the difference in market value and the depreciation in the value of the use of the premises resulting from the nuisance.

The reason given by the Iowa court for holding that such a nuisance is not permanent is that the person creating it has the legal right and is under the legal obligation to remove, change or repair it and thereby terminate the injury therefrom, and, being abatable, it is not considered a permanent nuisance. In the case of a continuing nuisance the measure of damage is the loss in value of the use of the land. The Iowa court, however, although believing these to be the established rules in cases of this kind, added that this question as to permanent and continuing nuisance is one upon which other courts have been in conflict and its own decisions not always in apparent harmony. Nor are the decisions on measure of damages always in agreement.

Ownership of Water and Sewer Systems Installed by Owner in an Improvement Area

The owner of a plotted area in a village installed public improvements, including water and sewer systems, at its own expense. To induce the purchase of lots in the area, it represented to buyers that no assessments for these systems would be imposed because the purchase price of the lots included payment for the improvements. The owner of the area, it is held, could not thereafter claim the full ownership of these improvements. To the extent of the payment made therefor, these improvements became the property of the community, and its rights could be asserted by the local unit of government, in this case a village.

In its determination of the issue in this case, which was an action against the village by a public service company formed by the owner of the area, in which a mortgagee intervened, the Minnesota Supreme Court could find no applicable precedent or legal principle, and it was compelled, in the absence of prior authority, to develop and assert those legal principles which in its judgment would best serve the ends of justice in the case before it and in other like cases.

The utility company here was seeking to recover the value of fire hydrant and storm sewer service rendered to the community. It could not, it was held, include the portion of the water and storm sewer systems owned by the community. There was no express agreement by the village to pay for these services. The people of the community could not now be compelled, it was held, as members of the village, to contribute to the payment of hydrant and storm sewer services on a basis which assumed that these systems were still entirely owned by the utility and that the utility was entitled to a return on their full value. *Country Club District Service Co. v. Village of Edina*, 8 N. W. 2d 321, 214 Minn. 26.

Limestone Screenings and Tar for a Cheap Road Base

By **RAYMOND W. MURPHY**

City Engineer, Rye, N. Y.

IN 1942 we installed sewers in a new development, and it was necessary to lay at least temporary surfaces on the streets to carry bus traffic on a detour from the main highway as well as our own trucks which it was necessary to use in the vicinity.

In the past we have used cinders for such temporary road surfacing, but we thought that in this case we would try instead limestone screenings and dust. This material, left after crushing the various sizes of limestone, is about 80% dust and about 20% stone chips all of which are smaller than $\frac{1}{2}$ inch in size and average perhaps $\frac{1}{4}$ inch.

First the screenings, wet by rain or by hose in the barge, were spread from a truck through a spreader box to such depth as would give a 2-inch layer when rolled. Then tar (Federal specifications RT 2) was applied at the rate of 0.7 gallon per square yard and covered with sand and allowed to cure for a week. The tar penetrated into this base material more than an inch.

Following this the base was primed with Fed. Spec.

RT 8 at the rate of 0.4 gal. per square yard, and, after the excess sand blotting had been swept off, a layer of $\frac{3}{8}$ inch trap rock was spread smoothly $\frac{3}{4}$ inch thick, and rolled. The tar penetrated the $\frac{3}{8}$ inch stone completely.

In a few streets we added a seal of 0.3 gallon per square yard covered with $\frac{1}{4}$ inch trap.

In addition to the stone spreader box, roller, etc., we used two Model D. D. Highway sand spreaders for casting the sealing stone.

These streets have stood up exceptionally well. A few spots have failed where proper drainage had not been installed, but more than 95% of the surface is still in good condition and probably will serve nicely for a few more years, even though such a thin layer was used.

When it is realized that the screenings were delivered and spread at \$2.75 per cubic yard, and that only a little over a gallon of tar per square yard was used, it is seen that this treatment is every bit as cheap as primed cinders, and it is many times better.

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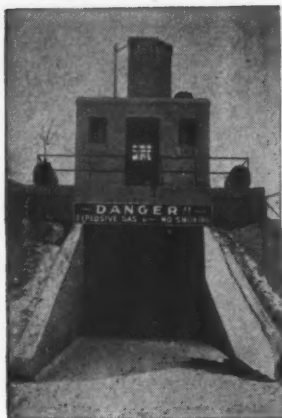
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Entrance to sludge control rooms, Cranston, R. I.

The Sewerage Digest

Abstracts of the main features of all important articles dealing with sewerage and sewage treatment that appeared in the previous month's periodicals.

Chlorination For Filter Pooling

Rotterdam, N. Y., operates two 34 ft. filters with rotary distributors built in 1940. After three years of operation, pooling gave trouble. Fire hosing gave only temporary relief—it did not reach deep enough. Chlorine was applied from 1:1 P.M. to 8 the following morning at the rate of 52 ppm giving a chlorine residual of 40 ppm. This gave a bleached appearance to the formerly black stone for a depth of 6" only, so a second dose was given the next night at 60 ppm and the stone then was found to be clean for a depth of 3 ft. Nitrification of the effluent rose from 15 ppm to 25 ppm; dissolved oxygen remained at 4.4 ppm. During the next 30 days nitrates dropped to 10-20 ppm and dissolved oxygen to 1.0 ppm, but both returned thereafter.^{H37*}

Rating Activated Sludge Plants

"Realizing the need for a more rational method of rating activated sludge plants, the writer has developed a method from operation data of the Indianapolis plant." These, he says, "indicate the fallacy in giving the rated capacity of an activated sludge plant in million gallons per day with no stipulation as to the concentration of B.O.D. or temperatures." He concluded that the capacity of an activated sludge plant for any month is dependent upon the concentration of B.O.D. in the sewage; and that the temperature of the sewage definitely plays an important part in determining it. The full effect of minimum and maximum temperatures does not seem to be evidenced in the rate of treatment until the month following. He proposes that the rated capacity of an activated sludge plant be based upon the mgd of sewage of stated B.O.D. strength and specified temperature.^{C95*}

Removal of Phosphorous From Sewage

The removal of nitrogen and/or phosphorous from sewage or sewage plant effluents may be important from the viewpoint of stream pollution control. It has been shown that the rate of biological stabilization of organic wastes is markedly influenced by the presence or absence of suitable amounts of nitrogen and phosphorous. The removal of phosphorous from sewage can readily be accomplished by treating it with one of the trivalent coagulants such as ferric chloride. Total phosphorous concentrations can be reduced to approximately 0.50 ppm and soluble to as low as 0.01 ppm with doses of 50 ppm of ferric chloride—60 to 70 ppm for effluents from activated sludge or trickling filter plants.

With the use of the proper amount of carbonaceous matter, glucose for example, practically all the nitrogen

and phosphorous can be tied up in the sludge; the use of refined carbohydrates for this purpose would not be economically feasible, but use of certain industrial wastes of a carbohydrate nature may be. Careful control of the amount of such matter added with respect to its ammonia content is necessary, for overtreatment generally results in effluents having a high B.O.D., while the sludges contain much lower contents of nitrogen and phosphorous and have much poorer settling characteristics.^{C96*}

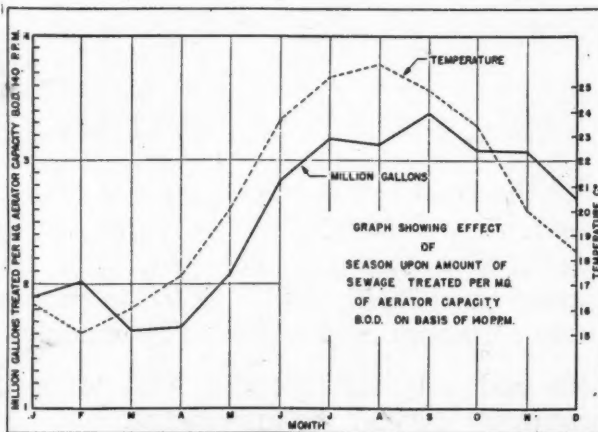
Digesting Sludge At Hunts Point Plant

Plans for treatment works at Hunts Point, New York City, which include preliminary sedimentation, activated sludge, and sludge digestion and gas utilization, contain a number of unusual features designed to overcome some of the difficulties encountered in operating this type of plant.

The sludge must be pumped through a main 1,000 ft. or more in length, which may become more or less clogged with solids. To provide for forcing these out by applying high pumping pressure, plunger-type pumps will be used capable of pumping against a head of 100 psi.

Force mains carrying primary sludge have to be cleaned out at intervals, chiefly because of grease, and this has been effected successfully by heating to about 180°.

Most digestion tanks are heated by passing hot water through coils in the tanks, but this heat transfer is very inefficient. It is planned to heat the activated sludge before it enters the tank, and also to heat the primary sludge, by passing their force mains in a service tunnel adjacent to the gas engines and boiler room, using four interconnected units, two for activated sludge, one for primary, and one as a standby. Each unit would consist of 350 ft. of 6" copper tube enclosed in an 8" steel pipe, the sludge



Courtesy Sewage Works Journal

Effect of temperature on aerator capacity.

*See Bibliography in the October issue.

passing through the copper tube and heating water through the space between the pipes; by which it is expected to effect a heat transfer of 200 to 500 Btu per hr. per sq. ft. per degree of differential. Maximum radiation loss from the digestion tank of 25% of the heat added to the sludge would require the sludge to be heated to 97° to maintain 85° in the tanks. Automatic devices would regulate the amount of heating water relative to the amount and temperature of the sludge to maintain the temperature of the latter constant. If more heat is needed than is available, or should exchangers be out of service temporarily, a relatively small tank will be provided through which the contents of the digestion tanks can be circulated and steam introduced through submerged heaters.

Each tank will have a centrifugal pump with capacity sufficient to keep its contents homogeneous by continuous circulation, taking sludge from the center bottom and discharging through one of five surface outlets, used in rotation. Other pumps can be used for transferring sludge from one tank to another. The displacement time in the digestion tanks will be about 20 days. Sludge from the 4 digestion tanks will be transferred to 4 "separation tanks," used in rotation, where it will consolidate and produce a clear supernatant, which would be removed at a constant low rate to avoid disturbance, using a P.F.T. "supernatant selector."^{C98}

Disposal of Industrial Wastes

In June, 1944, at the 17th annual meeting of the California Sewage Works Ass'n, a number of papers were read dealing with the disposal of wastes from the petroleum industry, fruit and vegetable canneries, fish canneries, brandy and molasses distilleries, and pulp and paper industries, all by superintendents or others connected with those industries; also discussions of the subject by representatives of the State Division of Fish and Game and the

State Dept. of Health. All of these considered the subject as affected by California laws, climate and other local industrial conditions, and it is interesting to note how these vary from those in other states and what effect they may have on the selection of disposal methods; such, for example, as the desirability of using the clarified liquid for irrigation, and the different aims and authorities allotted by the state laws to the Dept. of Health and the Division of Fish and Game, respectively.

The California oil fields handle about 40 mgd of liquid wastes and the oil refineries about 100 mgd, which are treated in more than 300 installations which cost about \$20,000,000. The disposal methods used are impounding for evaporation, diversion into surface streams, injection into subsurface sand formations, and disposal into waste alkali land or sand areas, into salt marshes or ocean, and into sewers. Disposal into sanitary sewers is considered the most satisfactory (from the industry's point of view). For treating oil field waste water, practically all plants use settling ponds. The industry feels that it is entitled to use the sewers in view of the taxes it pays, with a "normal" charge for excess quantities, and after a certain amount of pretreatment.^{C97}

The canneries of the state have an annual production of about 50,000,000 cases, utilizing 2 million tons of raw material, about half of it tomatoes. One plant, handling 45,000 tons a year, discharges into the city sewers an average of 1,000 gpm for short periods of time. It uses two rotary screens covered with sheet metal screens, the primary with 1/4" holes, the secondary with 1/16" holes. The liquid waste last year at times exceeded the capacity of the sewer, and the company developed methods of reducing it by 50%, chiefly by re-using the cooling water and discharging the waste water at a more uniform rate.^{C98 and 99}

The fish canning industry uses 2,000 gal. of salt water per ton of sardines which contains about 0.5% organic

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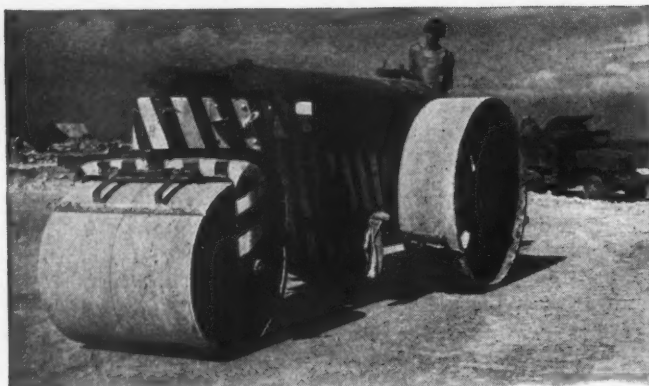
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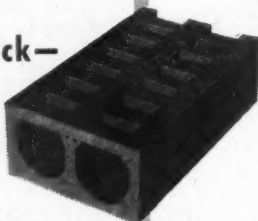
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solids, 400 gal. of salt water running as high as 1.0% organic solids, and 133 gal. averaging 6.0% solids. In a normal day, 4,000 tons of sardines are processed in the Los Angeles harbor district, giving a B.O.D. load probably equivalent to the sewage of several hundred thousand people. The industry is making tremendous studies in converting the solids into by-products, leaving a large volume of practically clear water which can be returned to the harbors.^{C100*}

Waste from brandy and molasses distilleries has a B.O.D. equivalent of 130 persons per ton of grapes converted to sweet wine, and in the Lodi District is equivalent to the sewage from 130,000 to 384,000 persons for a 90-day season. Land disposal is used by most distilleries, but creates a very offensive odor. Biological and chemical treatment, using lime and calcium chloride to precipitate the tartrates, then additional lime to precipitate much of the remaining solids, produces an effluent that can be handled on a trickling filter, while at present prices the sale of the tartrates would cover the cost of treatment. Wastes from grain distilleries, by evaporation, produce an excellent livestock food which returns an interest on the investment of \$100,000 per plant for the evaporators.^{C101*}

The pump, paper and paperboard industries in 1943 organized the National Council for Stream Improvement for research in the recovery and utilization of material now discharged into the surface waters of the country, and in 1944 appointed Harry W. Gehm as technical adviser. Arrangements have been made with the Mellon Institute for an extensive research program, to be under the direction of G. D. Beal. Many of the firms have offered to the Council the information on the subject that they have collected in the past by individual research.^{C104*}

Liquid Sludge As Fertilizer

The Guggenheim process sewage treatment works at Anderson, Ind., capacity 8 mgd, includes vacuum filtration and a multiple-hearth incinerator. Because of "the expense of operating the vacuum filters and the inconvenience of handling the filter cake," the use of these was discontinued in March, 1943, and the liquid sludge from the digester was pumped through a 2½" fire hose and discharged on the grounds about the plant, which have an area of 64 acres. No objectionable odors resulted. The hose deteriorated rapidly from continued use and was replaced with an underground iron pipe. This method of disposal has effected a substantial saving in cost and appears to be proving satisfactory.

Anderson's sewage contains, besides domestic sewage, wastes from pickling, chrome plating, a packing plant and canning factory. Some of these probably assist in precipitation in the primary tanks, which reduce the B.O.D. from an average of 157 ppm to 59 ppm, and the suspended solids from 233 to 75. The final effluent averages 13 ppm of B.O.D.^{C106*}

Maintaining Diffuser Plates

The Jackson, Mich., plant contains 8 diffused air aeration tanks treating a little over 9 mgd. During 1942 all the diffusion plates were removed and given a chromic acid bath. During 1943 it was necessary only to give them an occasional shot of chlorine and once in a while blow out the system by increasing the air output of the blowers for about 24 hr. After the acid cleaning, the air pressure was 6 lb. 8 oz. and this had increased to only 7 lb. 4 oz. in 1943. "The plant will continue to operate satisfactorily until this pressure reaches about 8 lb.," and "we feel that with the aid of chlorine and blowers we can avoid plate cleaning for a couple more years." Freedom from trouble has been aided by reducing the iron content of the sewage (contributed by industrial wastes) from 18 ppm to 8 ppm by having the industries keep the iron salts in their wastes out of the sewers.^{C110*}

*See Bibliography in the October issue.

New York's Sewage Treatment Program

About 40% of New York's sewage is now being treated. Works are being planned for modern plants to increase this to 85%. At the 26th Ward plant only primary sedimentation and sludge digestion are provided, but secondary treatment will be added when conditions permit. The comprehensive plan for the entire city include 17 treatment works, 7 of which are now operating. Six will provide complete treatment by the activated sludge process, and the other 11 will employ either plain sedimentation, with or without chlorination, or an intermediate form of treatment recently developed called "modified sewage aeration." All sludge will be digested and the gas used for power production.

The largest single project in the program is the extension of the Wards Island plant. The next largest is the Owls Head project, designed for 160 mgd; followed by the Newton Creek for 140 mgd, the Hunts Point for 120 mgd.^{H40}

Sewage Treatment for Portland, Oregon

In May 1944 Portland citizens voted a \$12,000,000 bond issue for providing treatment for the sewage of its 365,000 population. Its combined sewage is now discharged into the Willamette and Columbia rivers, and the sanitary sewage will be collected by interceptors, the diameter of which will range from one to 9 feet. The topography necessitates construction of several tunnels for the interceptors, one about 2 miles long, and of several deep siphons under navigable streams; also pumping stations in low-lying areas.

The treatment plant will be of the primary type, providing sedimentation and separate sludge digestion. The design capacity of the interceptor system, peak flow rate, is 155 mgd; that of the treatment plant has not yet been determined.^{H41}

Sewage Gas Engines at Marion

An activated sludge-digestion tank type of plant went into operation in Marion, Ind., in 1940. The digestion gas is utilized for pumping raw sewage against a 33 ft. head, providing compressed air, operating vacuum filter equipment, and operating many small motors. Two 75 hp and one 50 hp Climax gas engines are used, 73% of the gas used being sludge gas (the other 27% is natural gas), which also furnishes the heat for the digestion tanks and the buildings, recovered by heat exchangers. Cooling coils submerged in the aeration tanks provide cooling water temperature control in summer. The speed of the 50 hp engine which drives the pump is governed by a float in the raw sewage wet well. The engine is dismantled and overhauled (requiring 36 man-hours labor) after running 4300 to 5500 hours. The three engines have earned \$7772 in one year.

"Our gas engine operation experience" has been "a pleasant one to date" for the following reasons:

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- (2) Plenty of working space around engines so that dismantling is an easy job for the operator.
- (3) Provide a tool room and work shop, with cabinet space for stocking replacement parts.
- (4) Provide control signals to warn operators when engines are in trouble.
- (5) Have a reliable source of stand-by fuel so that engines can be kept in operation continuously.
- (6) Install heat recovery facilities of sufficient size so that engine temperatures may be kept constant by automatically controlled valves.
- (7) Provide oil filters to keep lubrication at highest possible efficiency.
- (8) Have sufficient number of thermometers located in water circulation system so operators can easily check temperature conditions.

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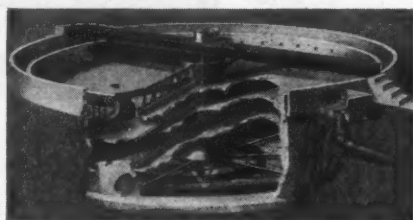
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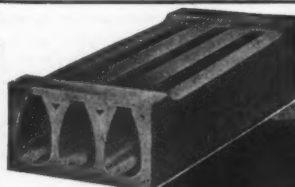
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(9) Wherever possible, provide duplicate engine-driven equipment for emergency use.

(10) Speed of pump engine should be controlled automatically by float tube from sewage well.^{G29}

A Digestion Tank Detail

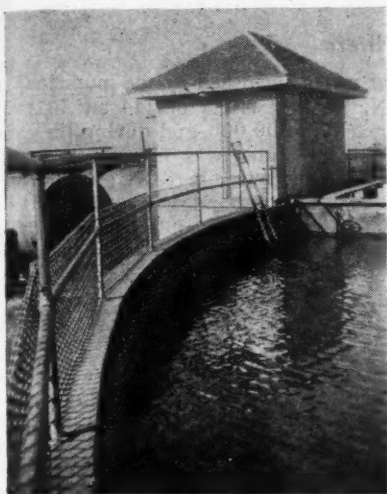
A treatment plant recently built at Norman, Oklahoma, contains two 60-ft. diam. digesters. Effort was made to conserve critical materials throughout the construction of the entire plant, and no sludge collectors were installed in the digesters. Instead, to aid in flushing sludge to the central sump, 8-in. diam. cast iron pipe sleeves extending through the roof are spaced 13 ft. apart around the periphery of the dome for the insertion of a flush pipe or hose. The bottoms of these sleeves extend 10 in. below the level of the supernatant to prevent the escape of sewage gas. Three banks of 8-in. cast iron sleeves near the top of the wall draw off the supernatant and deliver it to an 8-in. line where it returns by gravity to the agitator well.^{E15}

Bibliography of Sewerage Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; n, note or short article; p, paper before a society (complete or abstract); t, technical article.

- D The Surveyor**
- Balancing Peak and Storm Flows of Sewage. By L. B. Escritt. P. 391.
 - p. Postwar Possibilities in Sewage Works Design. By John Hurley. Pp. 395-398.
- August 25**
- Volume Characteristics and Disposal of Laundry Waste. By Harry W. Gehm. Pp. 409-410.
- September 1**
- p. Digester Heating and Mixing Equipment. By Vinton W. Bacon. Pp. 419-420.
- September 8**
- p. An Investigation of the Sewerage System of Harrogate. By D. W. Riley. Pp. 431-433.
- E Engineering News-Record**
- October 5**
- War-Inspired Sewage Disposal Plant Will Provide Postwar Benefits. Pp. 76-79.
 - Solving a Sanitation Problem in Peru. By Benjamin A. Whisler and Robert K. Horton. Pp. 82-87.
 - Nazi Malaria Mosquito Campaign Halted by Airplane Dusting of DDT. Pp. 87-88.
- G Water Works and Sewerage**
- October**
- Gas Engine Performance at Marion, Ind. By David Backmeyer. Pp. 335-339.
 - Solving a Sewage Pumping Problem. By W. W. Glover. Pp. 367-368.
- H Sewage Works Engineering**
- October**
- New York City Plans \$82,000,000 Sewage Works Construction. By Richard H. Gould. Pp. 506-508.
 - Portland Will Clean Up Willamette River. By R. E. Koon. Pp. 509-510.
 - \$21,000,000 Treatment Plant for Los Angeles Area. By E. S. Chase. P. 511.
 - Chicago Sanitary District Plans Plant Enlargement and Sewers. By J. M. Mercer. Pp. 512-513.
 - Ohio Pollution May Be Corrected by Barkley-Spence Bill. By Hudson Biery. Pp. 514-515, 540.
 - Injuries and Infections of Sewer and Sewage Plant Operators. Pp. 526-527.
- J American City**
- October**
- Anderson, Ind., Settles Its Sewerage Problems. By R. R. Baxter. Pp. 69-71.
 - Modern Sewage Treatment Plant of New London, Conn. By Walter F. Capwell. Pp. 83-84.
- K Proceedings, Am. Soc. of Civil Engineers**
- October**
- Sludge Concentration in Los Angeles, Calif. By R. F. Goudey. Pp. 1276-1279.
 - Thickening Tanks at Baltimore. By C. E. Keefer. Pp. 1280-1282.
 - Some Results in the State of New Jersey. By Willem Rudolfs. Pp. 1283-1289.
 - Concentration of Sewage Sludges at New York, N. Y. By Wellington Donaldson. Pp. 1290-1296.
- P Public Works**
- October**
- Postwar Sewerage Construction. Pp. 13-14, 40, 44, 58.
 - Cleaning Glass Greenhouse Covers Over Sludge Drying Beds. By R. F. Snyder. Pp. 19-20.
 - How Rolla Provided Sewerage For Its Wartime Population. By J. F. Kilpatrick. Pp. 23-24.
 - n. Who Has a Cure for Leaky Sewers? P. 32.
 - Repairing a Sewer Washout. By W. E. Barnes. P. 38.



Head house and mixing chamber.
Butler, Missouri.

The Waterworks Digest

Abstracts of the main features of all important articles dealing with waterworks and water purification that appeared in the previous month's periodicals.

Modernizing Meter Rates

Analyzing meter rates in 582 cities as gathered by four investigators from 1926 to 1940, the author finds that these rates (in cents per 1,000 gallons) generally fall between a minimum of $\frac{43}{P^{0.17}}$ and a maximum of $\frac{81}{P^{0.225}}$

with an average of $\frac{60}{P^{0.2}}$, in which P is the population of

the city in thousands.

The service charge is favored by most waterworks men, but the minimum charge, frequently employed in gas and electric rates, is far better known and acceptable to the public. As to free water to municipal institutions and others, "The sanest method is to charge everyone. By the same token, a municipal water department may well be charged for the many services in the form of rent, legal advice and other items which it usually receives gratis."

Based on a study of numerous factors entering into the cost of service and methods of distributing it among the consumers, he makes the following recommendations:

(1) Cost of water delivered at the municipal limits or at the end of transmission lines (i.e., wholesale cost) should first be computed.

(2) Minimum industrial rates should be based on wholesale cost plus a small transportation charge for carrying water through distribution mains. (It is believed that most industrial rates should lie between one-fourth and one-third of the domestic rate.)

(3) Fire protection costs should be derived preferably from an inch-square-foot and hydrant charge.

(4) Domestic rates should be particularly examined to insure their carrying a full share of hidden costs that are too frequently omitted.

(5) All water should be charged for by the water department or company and in turn a water department should reimburse a municipality for all such items as rent, legal and administrative costs.^{A122}

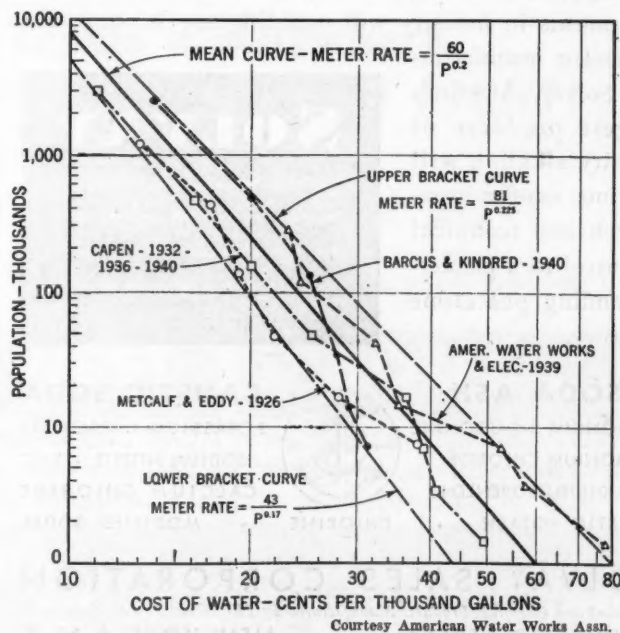
Regulations for Use of Sprinklers

Richmond, Va., encourages the use of private sprinklers by adopting regulations that apparently are satisfactory to all concerned. No charge is made for water used through the sprinkler service and no meter is installed, unless the consumer is found to be using water through this service for purposes other than extinguishing fires. The consumer pays the entire cost of installing the service; also that of enlarging the capacity of the public mains if the required capacity exceeds that of other similar areas. No connection larger than 4" is permitted, but a larger pipe may be used beyond the cut-off valve. When using 300 gpm (enough

for 85% of fires) the pressure loss through a 4" opening and valve and 100 ft. of 8" service pipe is only 2.3 ft. more than if an 8" connection were used. But if the service should be broken and the cut-off valve be inaccessible (as often occurs during a fire) the discharge wasted through an 8" connection would be several times that through a 4" and might cripple the fire-fighting supply.^F

Control of Synura by Chlorine

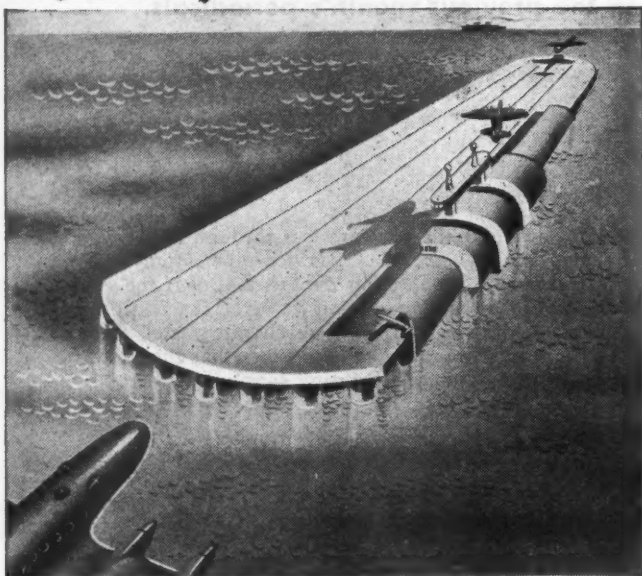
Albany, N. Y., controls synura in its Alcove reservoir (area 1,440 acres) by use of copper sulphate. But in March, 1943, synura appeared and, as the reservoir was still covered with ice, use of copper sulphate was out of the question although a serious cucumber taste developed. Breakpoint chlorination of the raw water was tried and continued from March 25 to April 20, the breakpoint varying between 1.8 and 2.1 ppm, depending upon the concentration of the organisms. Sulphur dioxide was used as a dechlorinating agent to maintain 0.02 to 0.03 ppm chlorine residual in the filtered water. On June 26 synura appeared again and again breakpoint chlorination was employed, this time without use of sulphur dioxide as a dechlorinant but there was no evidence of chlorinous tastes.^F



Relation between meter rates and population.

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Modernizing Williamson's Filters

Consumption of water furnished by the municipal plant of Williamson, N. Y., increased from 44 mg in 1939 to 91 mg in 1943, reaching 500,000 gpd during the canning season. Until 1934 the water was filtered through two gravity rapid sand filters containing 18" of sand on 18" of gravel, with combined air and water wash. Between 1934 and 1941 the filters were completely reconditioned; the corroded underdrainage system was replaced, air wash equipment was removed, new gravel placed and anthracite substituted for sand; and a Palmer surface wash unit was placed in each filter. These changes increased the filter capacity about 20%.

In 1941 it became necessary to increase the capacity practically 50% and plans for this were prepared and construction begun; and in February, 1944, the modernized filter plant went into service. Two new filter units were added, square instead of rectangular, Carborundum porous plates were used instead of gravel, and 27" of anthracite placed directly on them. Palmer surface wash was provided, and the washwater troughs set to give a rise of 24" instead of 18". The piping was so installed that each piece of pipe and fitting is accessible and can be removed readily. Filter runs have increased from the former 10 hr. to 120 hr.

New pumping equipment installed at the same time permitted pumping 91 mg of water in 1943 for 12% less cost than that of pumping 53 mg in 1940. The combined operating cost of both treatment and pumping has dropped from \$130.50 per mg to \$93.80. The city is paying for the improvements entirely from water rents.^{G38}

Consumer-Owned Meters in Milwaukee

Consumers in Milwaukee, Wis., own and install the meters and therefore there are 31 different makes and models in use ranging in size from 5/8 inch to 16 inch. Since the water department repairs the meters, a very large inventory of parts must be kept in stock and each meter must be segregated and carefully handled in order that it may be returned to its rightful owner.

New meters are tested in the meter shop and then installed by the departmental employees. There are 98,393 meters in service. They are maintained free of charge by the department, except when damaged by frost, hot water or water hammer.^{A120}

Centrifugal Pump Discharge Valve Control

Centrifugal pump reversals have resulted in the destruction of pumping units, and the seriousness of such an occurrence warrants every effort to prevent it. A check valve in the pump discharge assures this. It is also desirable to control the rate of pump discharge when the pump is being started or stopped, which is effected by means of an automatically-controlled discharge valve. A new discharge valve control has been developed and installed on a steam-turbine-driven pump at Milwaukee, Wis., which is based on pump rotation, the control and discharge valves remaining in their respective closed positions when the pump is not rotating, and cannot move to open position until the pump has attained the desired speed in the pumping direction. Neither is dependent on velocity head or differential pressure for closure. The author, however, thinks that the combination of a check valve and an automatically controlled discharge valve is the ideal arrangement, and plans are now being prepared to provide, as a postwar project, complete check valve protection for Milwaukee's centrifugal pumps.^{A121}

Joint Administration Of Water and Sewage Works

The merits of joint operation of water works and sewage treatment plants appear to be: 1. A logical handling of two closely related public services. 2. Possibilities for better financing. 3. A more closely knit engineering divi-

sion for planning postwar projects. 4. More uniformity in policy making. 5. Better controlled public contacts and relations and restoration of public confidence. 6. Closer and more centralized contact with the administrative and legislative branches of the city and in consequence a better utilization of top management. 7. Joint use of office personnel in billing for services rendered. (This will increase with sewer rental.) 8. Use of a common store room for ordinary maintenance supplies. 9. Joint use of tools, equipment and labor force in emergencies. 10. Joint use of garage and repair shop facilities.

Kenosha, Wis., is believed to be the only city whose water utility built a sewage treatment plant as an adjunct in order to protect the water supply, the entire cost of construction being borne by the water utility because it could sell its bonds and the city could not without exceeding its bond limit. The "Dept. of New and Used Water" operates both utilities but funds for the maintenance and operation of the sewage plant are derived from the general tax levy.

At Fort Dodge, Ia., the sewer system always had been managed by the water works department, and when a sewage treatment plant was constructed the entire program was administered through the water department. The billing system was changed to provide for the sewage rental bill, which is collected with the water bill. All accounting is handled in the one office under the direction of one man. There are separate men in charge of the office, the meter shop, the sewage treatment plant, the water plant, the hydro-electric plant, the water and sewer systems, and garbage collection and disposal. The principal benefit of this plan is interchange of men and equipment and elimination of duplication of effort. A number of waterworks managers in cities under 60,000, and of consulting engineers, were asked for their opinion, and all believed it definitely beneficial, principally from an economical point of view.

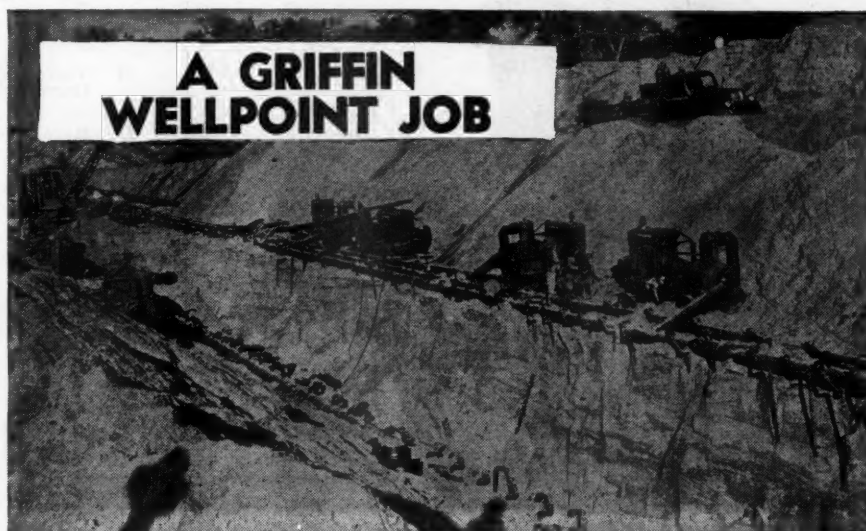
Summing up the problems of pre-war, war and postwar periods, Mr. Amiss thinks that "joint operation sustained less ill effect than separate operation. . . . As we operate, it is hard to differentiate between the two departments or units, they are so closely allied and interchangeable. All equipment is available under this setup."^{A123}

Tests of Jointing Compounds

The Milwaukee, Wis., water department some time ago investigated three makes of sulphur-base jointing compounds as to nature of material, decrease of sulphur content by melting, melting time and pouring temperature, and leakage. It was found that one compound contained 48.46% sulphur, another 55.00%, and the third 60.78%. The sand contents were 47.88%, 41.56% and 36.62% respectively. The remaining 3.66% to 2.60% was composed of sodium chloride and carbon and water-soluble matter. After melting and hardening, the sulphur content decreased 4.75%, 0.91% and 17.25% respectively leaving the sulphur content 46.16% 54.50% and 50.29%.

The melting times was 25½ min., 19½ min. and 24½ min. The pouring temperatures varied from minimums of 266° and 284° to maximums of 282° to 311°, above which the sulphur became too thick to pour. Leakage tests were made by laying four sets of three length each of 12" pipe, the three compounds and lead being used for jointing the four sets. Each of these was plugged at one end and capped at the other, and they were subjected to 60 to 70 lb. pressure continuously for 60 days. After 20 days there was very little leakage, and all leakage ceased soon after the 38th day. Each set was then subjected to high pressures until the caps blew off. Of the six sulphur joints, five became moist at 200 lb. and the sixth at 550 lb. All began to drip slightly at about 500 lb., and the caps blew off at 950 lb., 700 lb. and 800 lb. respectively. Both lead joints remained tight until the cap blew off at 450 lb.^{A119}

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Bibliography of Waterworks Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; n, note or short article; p, paper before a society (complete or abstract); t, technical article.

- A** *Journal, American Water Works Ass'n*
October
- 119. The Design and Construction of the Milwaukee Water Works. By Joseph P. Schwada. Pp. 1019-1061.
 - 120. The Operation and Maintenance of the Milwaukee Water Works System. By Herbert H. Brown. Pp. 1063-1069.
 - 121. Development of Centrifugal Pump Discharge Valve Control at Milwaukee's Riverside Pumping Station. By Harrison B. Hoefer. Pp. 1070-1075.
 - 122. Modernizing Meter Rates. By Charles H. Capen. Pp. 1076-1084.
 - 123. Wartime Problems of Jointly Administered Water and Sewage Works. A symposium. By Wendell R. La Due, James W. Myers, Jr., John W. Pray and Thos. L. Amis, Pp. 1085-1096.
 - 124. Management and Control of Public Water Supply Services in the Other American Republics. By Harold B. Gotaas and Robert D. Mitchell. Pp. 1097-1108.
 - 125. The Research Laboratories of the Melbourne and Metropolitan Board of Works. Pp. 1109-1114.
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September 8
- 28. Taste and Odor Problems at Winnipeg, Canada. By W. D. Hunt. Pp. 433-434.
- September 15
- 29. Rural Water Supplies and Sewerage. Pp. 443-444.
- F** *Water Works Engineering*
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- 70. Control of Synura in Winter by Breakpoint Chlorination. P. 1184.
 - 71. Forecast of Postwar Activities. Pp. 1193-1196.
 - 72. Taste and Odor Control. Pp. 1197, 1213.
- October 18
- 73. Analyzing Distribution Systems. By R. G. Kincaid. Pp. 1238-1242.
 - 74. Taste and Odor Control. Pp. 1246, 1267.
- G** *Water Works and Sewerage*
October
- 37. Selecting Deep Well Centrifugal Pumps. By Axel O. Fabrin. Pp. 348-352.
 - 38. Wartime Reconstruction of Water Treatment Works at Williamson, N. Y. By A. Bradford Squire. Pp. 357-361.
- J** *American City*
October
- 22. Water Works Ski-Troopers. By H. A. Van Norman. Pp. 67-69.
 - 23. Radford, Virginia, Builds a 2 mgd Filtration Plant. By W. T. Wells. Pp. 79-81.
 - 24. Philadelphia's Water Works from 1798 to 1944. By Martin J. McLaughlin. Pp. 86-87, 129.
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- K** *Proceedings, Am. Soc. of Civil Engineers*
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- P** *Public Works*
October
- 43. A Study of Recent Water Treatment Plants. Pp. 17-18.
 - 44. Correct and Incorrect Preparation of Graphs. Pp. 27, 34, 36.
 - 45. Bacteriological Control of Army Water Supplies in the Fourth Service Command. By V. Bruce Sundstrom. Pp. 28, 30, 32.
 - 46. Replacing 36-Inch Gate Valves. By Timothy W. Good. Pp. 56-57.
- X** *Journal, Pennsylvania Water Works Operators Ass'n*
Year of 1944
- 8. A Review of the Basic Data on Chlorination and Probable Postwar Practices. By A. E. Griffin and N. S. Chamberlin. Pp. 57-63.
 - 9. A Review of the Basic Data of Bacteriology. By Martin E. Flentje. Pp. 65-73.

War and Postwar Emergencies

(Continued from page 7)

tration of federal operation of control towers at all airports serving scheduled commercial airline operations."

It also recommended the creation by each state of a state airport commission or similar authority, to supervise such aviation activities as may come within its jurisdiction; also the immediate re-enactment into state laws of present CAA safety regulations.

Keeping Up With New Equipment



Koehring 1/2 yd. Shovel.

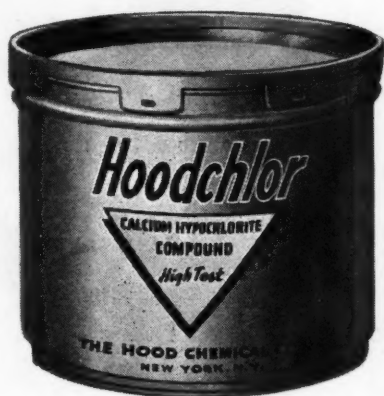
A New Half-yard Shovel

Koehring Company,

3026 West Concordia Ave., Milwaukee, Wis.

The Half-yard Shovel is convertible to Crane, Drag-line or Pull Shovel. It is also available as a Cruiser Crane mounted on rubber tires, and can be furnished for truck mounting. Orders are now being accepted on a priority basis for shipment when present military needs are terminated. This post-war model is one of many that Koehring will have available for civilian requirements. It is known as Model 205. Many new features have been incorporated for greater speed, increased production capacity, easy operation, low maintenance costs.

Outstanding design improvements are: same boom for shovel or pull shovel operation; trigger-fast dipper trip; independent unit traction gear case; easily removable machinery units; instant travel reverse; spacious walk-around area; head room in all parts of cab. Complete information about the new Koehring 205 Half-yard shovel can be obtained from Koehring Company, Milwaukee 10, Wisconsin.



Hoodchlor's Handy New Container

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Their high test calcium hypochlorite Hoodchlor is being extensively used by civilian consumption at home, and by our armed forces as well and they announce a new and convenient container for this product. Hereafter the 25 lb. resealable pail of steel, lined with a special chlorine resistant lacquer will be a standard package for Hoodchlor. This pail is of extremely sturdy construction and has been adopted as a standard container for shipping certain chlorinated chemicals overseas to the armed forces. Hundreds of thousands of these pails have already been shipped into every war theatre with complete success.

The small size of these new containers, permitting more convenient handling, together with their resealable feature, will no doubt soon bring them into general use, sup-

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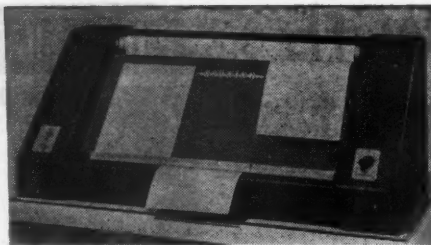
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planting the old type cumbersome drum container.

Hoodchlor is widely used by municipal and private waterworks for purifying drinking water. It is also used for sewage treatment, swimming pool sanitation, and as a germicide in hospitals, dairies, and poultry plants.

A New Bruning BW-Copyflex Printer Reproduces Drawings, Typewriting, Printing, etc.

New reproduction advantages—as well as double utility—are offered by a new machine recently announced by the Charles Bruning Co., 4700 Montrose



Bruning "Copyflex" Printer.

Street, Chicago. This machine, the BW-Copyflex Model 2 Continuous Printer, makes it possible to duplicate anything drawn, typed, printed or illustrated, as well as to make BW Prints . . . provid-

ing complete reproduction facilities.

This BW-Copyflex Continuous Printer exposes, with the use of Copyflex materials, tracings, line drawings, specifications, Van Dyke negatives, blue prints, etc. Original material with copy on both sides can be reproduced on either side or both sides. Copyflex Prints are developed in trays and dried in a simple drier (readily available).

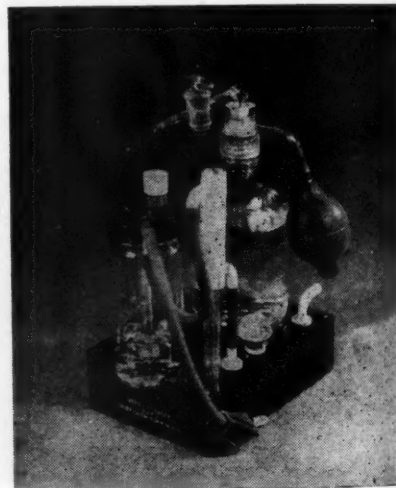
Compactly designed, the Copyflex Printer fits in desk-top space. It exposes roll stock or cut sheets up to 24 inches wide at a speed of 5 inches to 30 inches per minute. Because it is a continuous printer, speed of reproduction is considerably increased.

Rapid Water Analysis Apparatus

Chief Chemical Corporation
55 West 42nd Street
New York 18, N. Y.

The Aero-Titrator is said to furnish the plant operator and laboratory technician with a rapid precise method for the determination of hardness, calcium and magnesium in waters, both potable and industrial. It is also widely applicable to water problems in the process industries.

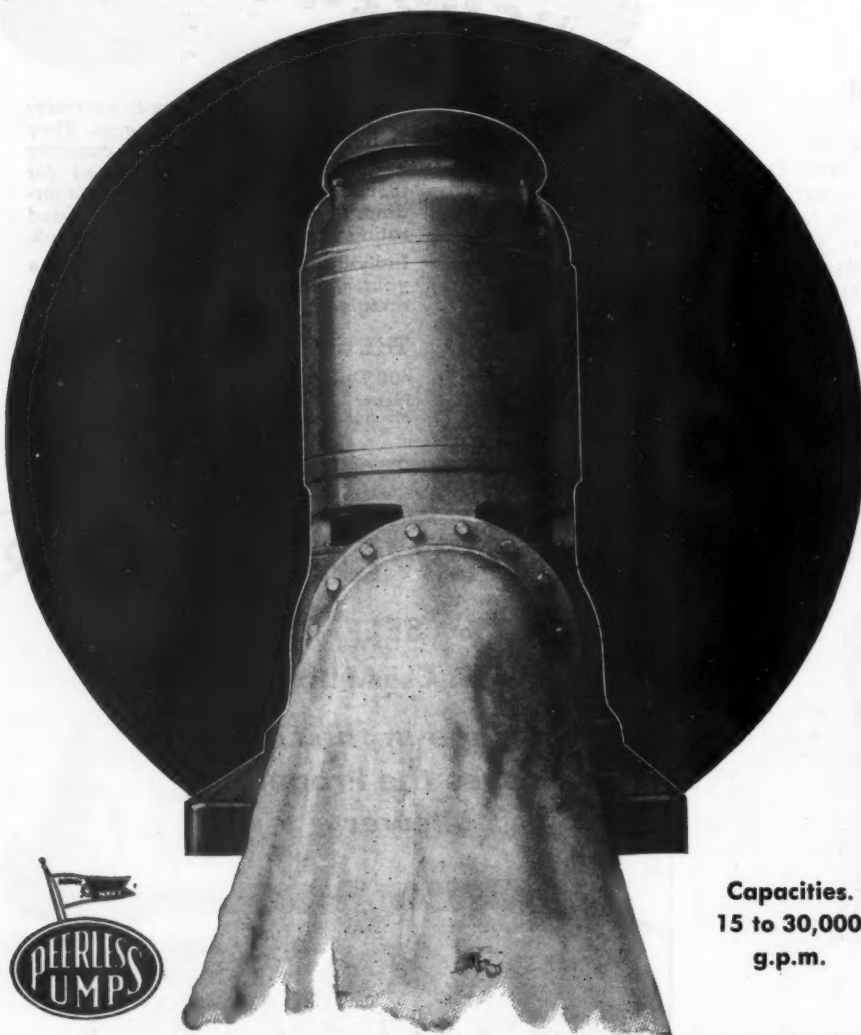
False endpoints are absent, and air agitation eliminates tedious and arm-breaking shaking by hand. The accuracy is comparable with gravimetric methods, and substances ordinarily present in water do not interfere at all.



Aero-Titrator.

So simple is the apparatus that any operator can readily master its operation. It makes use of a new endpoint, based on the foam-meter principle. This endpoint is unmistakable and is reproducible with a high degree of precision. Determinations are made within ten minutes. There is no waiting time to observe stability of lather. The operation is foolproof and gives identical results with different operators.

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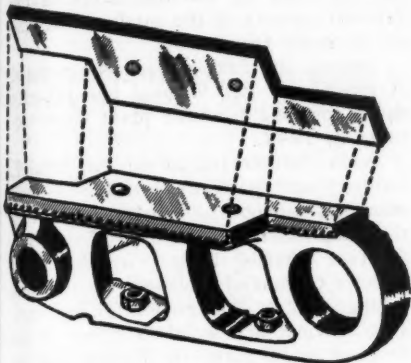
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San Jose 5, Fresno 16, Calif.

plastic construction. It functions in the presence of interfering substances and it can be used directly with samples which contain chlorides up to 2,000 ppm. Sulfates up to 1,000 ppm are also without effect.



"Alligator" track-link repair plates.

Tractor Links Salvaged by New Weld Method

*Pan-American Steel Products Co.
815 Superior Avenue
Cleveland 14, Ohio*

The track links on track-laying tractors which become worn by excessive abrasion can now be restored to a new high of efficiency with Alligator track-link repair plates made of a special work hardening steel which has high resistance to abrasive action.

These plates fit the top of the worn part of the track-link and are welded to the casting. They provide a new rolled steel surface for the rail which is said to give longer wear than the original new casting, and have been found practical and economical by many tractor owners and government agencies who operate track-laying tractors.

Another Pan-American product which has met the test of tractor owners throughout the country is the Alligator brand Grip Lug used to repair and rebuild worn grousers on tractor shoes.

Other products include Alligator brand manganese cast bars for repointing digger teeth and Alligoy hard surfacing welding rod, and a line of tool and die steel.

"Highways of the Air"

A new review of fact and opinion on the importance of radio in aviation, for distribution to the aviation industry, has just been issued by Radio Receptor Co., Inc., of 251 West 19th Street, New York 11, N. Y.

Due to the impetus of the war, aeronautical radio is now claiming much attention. The initial issue of "Highways of the Air" contains an article on the Army Airways Communications System by Lt. Walter W. Fawcett, Jr., illustrating the mechanics of radio in the operation of the military airways; "Airways and Ground Facilities of the Future" by William A. M. Burden, Assistant Secretary of Commerce; "Radio in Aviation" by Charles I. Stanton, Civil Aeronautics Administrator, and the fifth reprint of the original edition of "High-

ways of the Air," plus many well-defined illustrations and diagrams.

Radio Receptor Co., Inc., ranks as a pioneer in the development of much important radio aviation equipment now in use. Its purposes to publish "Highways of the Air" at intervals for free distribution to those interested in the development of radio in aviation as an aid to the protection of life and property.

Disposal of Community Refuse by Incineration

*Morse Boulger Destructor Co.
205 East 42nd Street
New York 17, N. Y.*

In a 34-page bulletin this company

publishes a discussion of incineration from a common sense standpoint, illustrated by numerous photographs of typical installations of incineration plants.

In this bulletin Morse Boulger says, "A sincere effort is made to give the basic factors to be considered in setting up a disposal system, and the basic requirements for successful incineration." Write for Bulletin No. 110.

The Dorrco Hydro-Treator

*The Dorr Company
570 Lexington Avenue
New York 22, N. Y.*

In a 28-page catalogue, the Dorr Company describes and illustrates the

LET'S TALK TURKEY

Post-war employment is your problem. When war-plants start to close down and men return home looking for jobs, public works will be expected to produce employment just as they did in the early 'Thirties. This doesn't mean a lot of unwanted and unnecessary projects. Millions of dollars of badly needed water-works and sewerage-construction alone have been held up by the war. The important thing is to have everything ready to break ground when you are called on. Your Committee on Water Works and Sewage Works Development again urges you to BLUEPRINT NOW!



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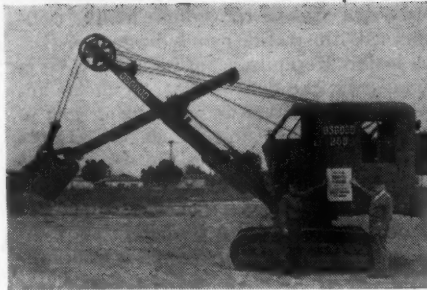
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Dorrco Hydro-Treator, a self-contained water-treatment unit combining Flocculation, Sludge Thickening and Clarification. The company says the Hydro-Treator combines all three principles in an efficient, simple manner and reduces treatment time as compared with conventional types of plants and effects considerable saving in plant construction costs. Write for Bulletin 9041.

1000th "Fighting Osgood" Goes to War

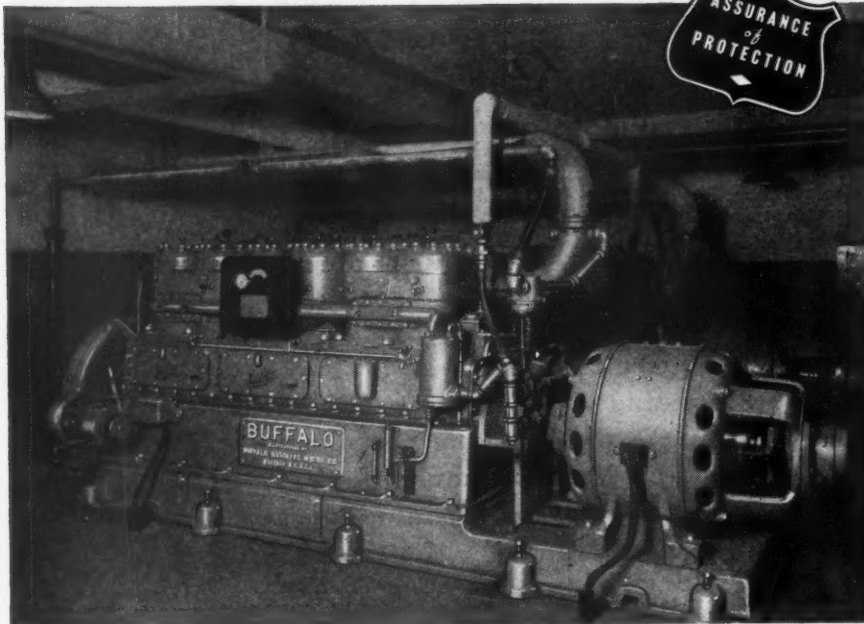
Ed Beicher (left), plant superintendent, and M. C. McNeil (right), president of The Osgood Company, prepare to present the 1000th Model 200 "Fighting Osgood" to the Corps of Engineers, U. S. Army.



1000th Osgood.

Completion of the 1000th Model 200 "Fighting Osgood" for the U. S. Army Engineers Corps marked another milestone in the industrial wartime effort of The Osgood Company. During this war,

REACHING ITS FULL LOAD In 30 Seconds



Model ATT—for emergency service—Western Union Tel. Co., St. Louis, Mo.

The big thing that the buyer of a standby power unit wants is assurance of protection—but some extra benefits are important too.

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their specifications will prove to the engineer that for unfailing dependability the Buffalo engine is beyond doubt.

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DEPT. PW-114

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When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

as in the last one, the entire production of the Osgood plants has been devoted to the manufacture of shovels and cranes for the Army and Navy, Maritime Commission, Lend-Lease and shipyards. As a result, Osgood equipment is performing its share of wartime tasks in the farthest corners of the earth, as well as on the home front.

Among the first to earn the coveted Army-Navy "E," Osgood has proudly flown this flag over the plant since October 7, 1942.

As a further tribute to the loyalty, industry and patriotism of the Osgood men and women, and to commemorate the completion of the 1000th Model 200, Captain Charles Bolton, of the Fifth Service Command, accepted the machine in the name of the Corps of Engineers, U. S. Army, at special exercises at the Osgood main plant in Marion. In response to Captain Bolton's thanks for the work Osgood employees are doing, President McNeil pledged the continued cooperation of company workers.

Assisting Osgood in this production record were The Columbia Machinery & Engineering Co., Hamilton, Ohio, and Osgood's associates, The General Excavator Co. of Marion. Both of these companies built Model 200's to Osgood specifications.

A Sign Manual

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This new Lyle Sign Manual illustrates most of the signs characterized as National Standard Signs and shows typical examples of each classification. Signs other than National Standards that have wide acceptance and have proved practical in actual service are also shown under proper classification. The Lyle line includes signs and signals, plain and reflectorized, for the control of traffic on streets and highways—for railroad crossing protection—for road building contractors and public utilities—street name identification signs, city entrance and parkway signs—together with a complete line of allied equipment and accessories.

All types of signs are illustrated in colors. Before ordering signs write Lyle for booklet No. B40.

Procedures for Testing Soils

American Society for Testing Materials
260 South Broad Street
Philadelphia 2, Pa.

Recently issued by the American Society for Testing Materials through the intensive work of its Committee D-18 on Soils for Engineering Purposes is this 210-page compilation, giving, in addition to all of the A.S.T.M. standard methods, some 38 suggested procedures for investigating soil and soil mixtures. The book is arranged in five sections with standard tests, if any, covered first under each section, then followed by the suggested methods. The five parts are as follows: Part I, Indicator Tests on Soils; Part II, Compaction and Consoli-

duction Tests on Soils; Part III, Strength Tests on Soils; Part IV, Tests for Soil Cement; and Part V, Tests for Soil-Bituminous Mixtures. Copies of the publication in heavy paper binding can be obtained from A.S.T.M. Headquarters at \$2.25; reduced prices on orders in quantity.

Interregional Route Through a City Being Planned

A preliminary report on the best Interregional Highway route through the city of San Antonio is now being prepared for the State Highway Department of Texas by Michael Baker, Jr., Consulting Engineer, Planner, and Surveyor, of Rochester, Pa.

To arrive at the best possible pattern for the cross-town routing of the Interregional Highway north, south, and east within the city, the Baker engineers are busy analyzing San Antonio's traffic problems. At the same time they are carefully preserving all of the city's existing characteristics. The report is also taking into consideration a part of the city's comprehensive planning program, determining highway routes from the viewpoint of property damage and the economics of the business and trade areas, both within and outside the city.

New Officials for American Public Works Associations

Under the provisions of the recently enacted constitutional amendment, new Association officers elected at the 1944 annual meeting included the President, four Area Vice-Presidents and the Treasurer. At its meeting of September 24, 1944, the Board of Directors by resolution fixed the boundaries of the areas represented by the four Vice-Presidents, in accordance with the geographical division suggested at the time of the letter ballot. The constitutional amendment provides for four members at large on the Board of Directors.

Elected to the Presidency at the annual meeting was Colonel Stuart M. Weaver, Washington, D. C. Colonel Weaver, now Chief, Repairs and Utilities Branch, Military Construction Division, is on leave from his post as Secretary of the Board of Commissioners, Montclair, N. J. Captain Samuel S. Baxter, Corps of Engineers, on leave from the Assistant Directorship, Department of Public Works, Philadelphia, Pa., was elected to the Vice-Presidency to represent the Eastern Area; J. W. Morgan, Commissioner of Public Improvements of Birmingham, Ala., Southern Area; Lloyd M. Johnson, Commissioner of Streets and Electricity, Chicago, Ill., Central Area; and Walter N. Frickstad, City Engineer of Oakland, Calif., Western Area. Vice-Presidents Johnson and Morgan were elected to two-year terms, Baxter and Frickstad to one year each.

Albert P. Learned, Consulting Engineer of Kansas City, Mo., was re-elected Treasurer for a one-year term. E. A. Fisher, Lakewood, Ohio, City Engineer, and William A. Xanten, Superintendent

of the Washington, D. C., City Refuse Division, will continue to serve as members of the Board of Directors through 1945; Charles L. Wartelle, City Engineer of Seattle, Wash., and William Sydow, Miami Director of Public Service, will serve as Board members at large through 1946.

New York Metropolitan Chapter APWA Formed

A New York and N. E. New Jersey Metropolitan Chapter of the American Public Works Association was formed at a meeting held in New York on October 28, 1944. Allan H. Rogers, Superintendent of Public Works, Garden City,

N. Y., was elected temporary chairman. Early in December there will be another meeting to elect officers and engage in the chapter's first round-table discussion. All public works engineers and officials in the metropolitan district are invited and those desiring a notice of the meeting date should write Mr. Rogers at once.

Peerless Pump Gets "E" Award

Award of the Army-Navy "E" to employees of the Peerless Pump Division-Food Machinery Corp. was made at a presentation ceremony in Los Angeles, Sept. 1. The recognition was contained

(Continued on page 62)



Army Signal Corps Photo

NOT IN THE BOOK

... But All In the Day's Work

Red coral of tropical islands wasn't given much consideration when the "daddy" of this OSGOOD shovel was designed.

Yet today dependable OSGOOD "20's" are perfectly at home, excavating road and runway material from rock-hard coral pits of South Pacific Islands and otherwise doing their part along the "trail to Tokyo."

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(Continued from page 60)

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CONVENTIONS

Nov. 14-15 . . . South Dakota Water and Sewage Works Conference, Lincoln Hotel, Watertown, S. D. It was originally planned for Sept. 19-20.

Nov. 14-15 . . . Eleventh Annual Conference of Virginia Section American Water Works Assn. John Marshall Hotel, Richmond. Secy.-Treas. State Office Bldg.

Nov. 22-25 . . . Highway Research Board Annual Meeting at Netherland Plaza Hotel, Cincinnati, Ohio.

Jan. 16-19, 1945 . . . The 42nd Annual Meeting of the American Road Builders' Association, Stevens Hotel, Chicago. Plans for launching the greatest highway program in history will be considered from every angle.

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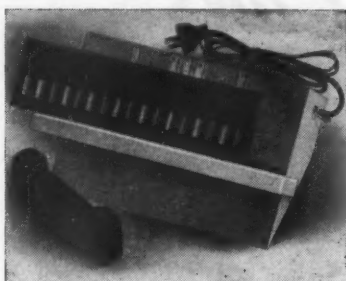


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(Continued from page 59)

in a letter from Secretary of the Navy, James V. Forrestal, who commended the employees on their outstanding production record.

Shown above, displaying the "E" pennant at the ceremony, are, left to right: A. W. Diesman, veteran Peerless employee; Rear Admiral Joseph R. DeFrees, U.S.N. (Ret.), Inspector of Naval Material, Los Angeles District; Clarence Frazier, vice-president and manager of Peerless Pump; Col. Rufus W. Putnam, Corps of Engineers, A.U.S., and John Crummey, chairman of the board, Food Mach. Corp., San Jose, Cal.

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J. E. Brown

J. E. Brown Appointed Made Assistant to General Sales Manager

Pittsburgh Equitable Meter Company-
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J. E. Brown, veteran sales executive, has been appointed assistant sales manager by A. J. Kerr, general sales manager of the combined organizations. Mr. Brown will maintain offices at the company's Pittsburgh headquarters.

"Ed," as he is known to his many friends and associates, joined the Pittsburgh Meter Company in 1906. Upon the consolidation of that firm with the Equitable Meter Company in 1926, he was made manager of the Chicago district, but returned to Pittsburgh the following year as director of sales for the company. In that position he also directed the advertising of the company until a separate department was formed for that purpose. In 1942 the home office sales order department was placed under Ed's jurisdiction, and this aided greatly in preparing him for his new position.

Born in Ohio, Ed is a graduate of Ohio University at Athens, in commercial training. His 38-year career in active business has been spent entirely with Pittsburgh Equitable Meter Co.

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- 3—Sewage Characteristics and Composition
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- 10—Contact Beds and Sand Filters
- 11—Chemical Treatment
- 12—Disinfection of Sewage
- 13—Sludge Digestion Tanks
- 15—Maintenance of Equipment
- 16—Other Factors

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Concrete, Early Strength

35. 64-page manual tells how to speed up year 'round concreting, shows how to secure high early strength and greater workability at temperatures either below or above freezing. Contains many actual examples of practical concreting operations; well illustrated with more than 60 photos, charts, graphs and tables. Calcium Chloride Assn., Penobscot Building, Detroit 26, Mich.

Concrete Mixers

44. Catalog and prices of Concrete Mixers, both Tilt and Non-Tilt types, from 3 1/4 to 56S sizes. The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

Drainage Products

70. Standard corrugated pipe, perforated pipe and MULTI PLATE pipe and arches — for culverts, sewers, subdrains, cattlepasses and other uses are described in a 48-page catalog entitled "ARMCO Drainage Products," issued by the Armco Drainage Products Association, Middletown, Ohio, and its associated member companies. Ask for Catalog No. 12.

Generators

80. Two portable generators, one for AC and the other for DC current are described in new bulletin issued by Homelite Corp., Port Chester, N. Y. Commonly used for operating electrical equipment in planes, tanks and trucks, or to charge batteries or to supplement batteries for starting main engines, etc.

Graders, Patrol

98. The Austin-Western 99M Power Grader with its powerful all wheel drive simplifies all construction and maintenance; handles difficult jobs with economy and efficiency; and does better work on grading, ditching, scarifying, snow plowing, loading, mixing, bulldozing, shoulder trenching and backsploping. Write for Bulletin 1946. Austin-Western Co., Aurora, Ill.

Mixing Plants, Asphalt

106. The Cleaver Asphalt Mixing Plant for an inexpensive plant mix and the Cleaver Tank Car Heater and Bituminous Booster are covered in illustrated catalogs sent on request by Cleaver-Brooks Co., 3112 W. Center St., Milwaukee 9, Wis.

Mud-Jack Method

107. How the Mud Jack Method for raising concrete curb, gutter, walls and street solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities — a new bulletin by Koehring Company, 3026 West Concordia Ave., Milwaukee 10, Wis.

Power Shovels

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Pumps

115. Interesting new booklet tells how to lengthen the life of your pumps. Explains how a little care will save a lot of wear. Write today for your copy. Homelite Corp., 2403 Riverdale Ave., Port Chester, N. Y.

116. New illustrated catalog and prices of Jaeger Sure Prime Pumps, 1" to 10" sizes, 7000 to 220,000 G.P.H. capacities, also Jetting, Caisson, Road Pumps, recently issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

117. New brochure by Gorman-Rupp Co., Mansfield, Ohio, illustrates and describes many of the pumps in their complete line. Covers heavy duty and standard duty self-priming centrifugals, jetting pumps, well point pumps, triplex road pumps and the lightweight pumps.

118. 16-page illustrated bulletin, SP-37, describes and illustrates complete C. H. & E. line of self-priming centrifugal pumps from 1/2" to 8", including lightweight models for easy portability. C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee 12, Wis.

119. "Self-Priming Centrifugal Pumps," a 12-page illustrated booklet showing details of construction of Carter Pumps. Ask for Bulletin 4310. Address: Ralph B. Carter Co., Hackensack, N. J.

120. "Humdinger" 2- to 8-inch self-priming portable pumps. A 23-page illustrated booklet giving full details. Address: Ralph B. Carter Co., Hackensack, N. J.

Road Building and Maintenance

126. Two and Four Wheel Scrapers, Bulldozers, Tamping Rollers, Winches, Hoists and Repair Towers are subject of special bulletins issued by Gar Wood Industries, 7924 Riopelle St., Detroit 11, Mich.

129. Warco Hydraulic Control Motor Graders, Duplex Hydraulic Scoops and Whizzard, easily transported, rollers are described and illustrated in literature available from W. A. Riddell Corp., Bucyrus, Ohio.

130. BG Maintainer, a powerful, speedy, low-priced machine for light road maintenance. Write for folder. Huber Mfg. Co., Marion, Ohio.

131. Speed Scoop. A versatile small scraper unit, ideal for emergency repairs. Illustrated folder issued by Huber Mfg. Co., Marion, Ohio.

Rock Drill Maintenance

132. New booklet presents through amusing cartoons useful hints on proper rock drill maintenance methods—what your men can do to get more work out of your tools with a minimum of expense for repairs and compressed air. Write The Cleveland Rock Drill Co., 3734 East 78th St., Cleveland 5, Ohio.

Rollers

133. New Tu-Ton roller of simple construction for use in rolling sidewalks along highways, playgrounds and other types of light rolling is fully described in a bulletin issued by C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee 12, Wis.

138. "The Buffalo-Springfield line of road rollers (tandem, 3-wheel, and 3-axle) are described in the latest catalog issued by the Buffalo-Springfield Roller Co., Springfield, Ohio.

140. This well-illustrated 16-page catalog describes the tandem, autocrat, cadet, and roll-a-plane rollers, and explains what each is intended to accomplish. Write Austin-Western Co., Aurora, Ill.

141. Three-Wheel Rollers. Huber Automotive type rollers in 5 to 8 ton sizes and Huber 10 & 12 ton diesel rollers. New bulletins give full details and specifications. Huber Mfg. Co., Marion, Ohio.

142. Tandem Rollers. Variable weight tandem roller with three speeds forward and reverse for new highway surfacing and old road conditioning. Huber Mfg. Co., Marion, O.

Soil Stabilization

150. "High-Service, Low Cost Roads" is one of the newer booklets using an effective combination of picture and text to set forth the principles and advantages of road surface stabilization with calcium chloride. Complete, interesting and well illustrated. 34 pages. Sent by Solvay Sales Corp., 40 Rector St., New York 6, N. Y.

152. The Columbia Chemical Division will be glad to furnish to anyone interested complete information dealing with Calcium Chloride Stabilized Roads. This literature contains many charts, tables and useful information and can be obtained by writing Columbia Chemical Div., Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh 19, Pa.

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11-44

Please send me without obligation the following booklets listed in your READERS'

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Name

Occupation

Street

City..... State.....

Spreader

187. Jaeger Paving equipment, including Mix-in-Place Roadbuilders, Bituminous Pavers, Concrete Bituminous Finishers, Adjustable Spreaders, Forms, etc.—4 complete catalogs of latest equipment in one cover, issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

Surface Consolidation and Maintenance

188. Detailed and illustrated presentation of the method and procedure in consolidated operations; explains how sub-soils can be conditioned to resist softening and frost action; how surfacing can be consolidated to provide smooth all-weather riding surfaces; how they can be maintained so as to prevent disintegration and gravel loss. Write the Calcium Chloride Association, Penobscot Bldg., Detroit 26, Mich., for Bulletin No. 29.

Transits and Levels

190. Transits, levels, and drafting room supplies: New Catalog just issued. 56 pages giving full illustrated descriptions of surveying instruments and accessories. Address: Warren-Knight, 136 N. 12th St., Philadelphia 7, Pa.

Wellpoints

195. New complete catalog, "Griffin Pointed Wellpoint Facts," just issued. Covers pre-drainage, describing wellpoints jetting pumps, with tables, diagrams and illustrations. Griffin Wellpoint Corp., 881 E. 141st St., New York 54, N. Y.

Street and Paving Maintenance

290. "Blacktop Road Maintenance and Construction Equipment"—Asphalt and tar kettles, flue type kettles, spray attachments with completely submerged pumps, tool heaters, surface heaters, road brooms, portable trail-o-rollers, etc. These are all described in detail and illustrated. This modern and up-to-date equipment for blacktop airport and road construction and maintenance is based upon experience and engineering research over a period of 42 years. Write for Catalog R. Littleford Bros., Inc., 452 East Pearl St., Cincinnati 2, O.

Fire Apparatus

300. Detailed information and advice about specially engineered Ward LaFrance apparatus will be sent on request. Ward LaFrance Div., Elmira, N. Y.

Snow Fighting**Snow Plows**

350. "Frink One-Way Sno-Flows" is a four page catalog illustrating and describing 5 models of One-Way Blade Type Sno-Flows for motor trucks from 1½ up to 8 tons capacity. Interchangeable with V Sno-Flow. Features, specifications and method of attaching. Carl H. Frink, Mfr., Clayton, 1000 Islands, N. Y.

Ice Control

352. Fast, self-feeding spreaders for ice control and seal coating that replace end gate on any dump truck, operated by driver of truck, are illustrated in new bulletin issued by Flink Co., 506 Vermillion St., Streator, Ill.

353. The new Flink sand spreader attachment that spreads sand faster from thinnest surfacing up to 2" layers and keeps a perfect edge is described in bulletin sent promptly by Flink Co., 506 Vermillion St., Streator, Ill.

Sanitary Engineering**Aero-Filter**

356. Aero-Filter Design Data is given in a new 32-page catalogue. It contains information on Advantages of Aero-Filter Process, Single Stage vs. Multi Stage Treatment, Filter Loadings, Rates of Flow and Results, Filter Depths, Recirculation, Sewage Pumps and Pump Control. Approximately 15 pages of blue prints are included in this instructive catalogue. Write Lakeside Engineering Co., 222 W. Adams St., Chicago 6, for a copy.

Air Release Valves

357. Automatic Air Release Valves for water, sewage and industrial uses are described and illustrated in new catalog issued by Simplex Valve & Meter Co., 6750 Upland St., Philadelphia 42, Pa.

358. Air Valves are the subject of Rensselaer Bulletin Q in which Air Re-

lease, as well as Air and Vacuum, types are described. Address: Rensselaer Valve Co., Troy, N. Y.

Analysis of Water

360. "Methods of Analyzing Water for Municipal and Industrial Use" is an excellent 94 page booklet with many useful tables and formulas. Sent on request by Solvay Sales Corp., 40 Rector St., New York 6, N. Y.

Activation and Aeration

367. A valuable booklet on porous diffuser plates and tubes for sewage treatment plants. Covers permeability, porosity, pore size and pressure loss data, with curves. Also information on installations, with sketches and pictures, specifications, methods of cleaning and studies in permeability. 20 pp. illustrated. Sent on request to Norton Company, Worcester 6, Mass.

Blowers

370. All interested in low cost air for sewage disposal will want a copy of this catalog describing operating principles and specifications of Roots-Connersville Aerating Blowers. Write to Roots-Connersville Blower Corp., 301 Valley Ave., Connersville, Ind.

Bodies, Special Truck

375. Gar Wood Hoists, and Bodies for every requirement including special bodies for sanitary refuse collection and for street sprinkling are illustrated and described in new catalog issued by Gar Wood Industries, 7924 Riopelle St., Detroit, Mich.

Chlorinators, Portable

379. Complete data on new portable chlorinator designed to meet emergency calls quickly and efficiently. Write Wallace & Tiernan Co., Inc., Newark 1, N. J.

380. "Emergency Sterilization Equipment," a new bulletin describing the advantages of Dual Drive Chlor-O-Feeders which can serve as either a permanent chemical feeder or as a portable emergency chlorinator. Order from Proportioners, Inc., 96 Coddling St., Providence 1, R. I.

Cleaning Water Mains

383. Water main cleaning by the National Method is title of 4-page folder describing methods and results obtained, with full data. National Water Main Cleaning Co., 30 Church St., New York 7, N. Y.

Cleaning Sewers With Own Forces

385. A 20-page booklet describes and illustrates a full line of sewer cleaning equipment—Rods, Root Cutters, Buckets, Nozzles and Flushers. Write W. H. Stewart (Pioneer Mfr. since 1901), Jacksonville, Fla., or P. O. Box 767, Syracuse, N. Y.

386. 32-page illustrated booklet explains how a city can clean its sewers and culverts with its own forces using the up-to-date Flexible Sewer Rod equipment. Illustrates and describes all necessary equipment. Issued by Flexible Sewer Rod Equipment Co., 9059 Venice Boul., Los Angeles 34, Calif.

387. Literature illustrating how cities, towns and villages using OK Champion Sewer Cleaners are doing a complete sewer cleaning job from street level. Three sizes of machines available in addition to full line of sewer rods and accessories. Issued by Champion Corporation, 4752 Sheffield Avenue, Hammond, Indiana.

388. Sewer Scooter, the only 100% self-propelling sewer cleaning machine, that removes sand, gravel, rocks, bricks, mud, grease, broken rods, metals, etc., from sewers is described in new illustrated bulletin. Write J. C. Fitzgerald, P. O. Box 289, Coral Gables, Fla.

Consulting Engineers

389. "Who, What, Why" outlines briefly the functions of the consulting chemist and chemical engineer. Covers various methods of cooperation, on different types of problems, with industry, with attorneys and with individuals. Foster D. Snell, Inc., 305 Washington St., Brooklyn, N. Y., will send a copy on request.

Feeders, Chlorine, Amonia and Chemical

391. Feeders of all types including Hypochlorinators, Reagent Feeders, Dry Chemical Feeders, Chlorinators and Ammoniators are available in a wide range of capacities for feeding all of the usual chemicals used in sanitation practice—manufactured by Wallace & Tiernan Co., Newark 1, N. J.

392. For chlorinating water supplies, sewage plants, swimming pools and feeding practically any chemical used in sanitation treatment of water and sewage. Flow of water controls dosage of chemical;

reagent feed is immediately adjustable. Starts and stops automatically. Literature from % Proportioners, Inc. % 96 Coddling St., Providence 1, R. I.

399. Pulsafeeders. A flow-proportional liquid chemical feeder, reciprocating type, fluid motor driven. Operating parts completely isolated from the chemical being fed. Micrometer adjustment. For feeding against high or low pressure. Wilson Chemical Feeders, Inc., 211 Clinton St., Buffalo 4, N. Y.

Filters, Vacuum

403. For bulletins on Vacuum Filters for dewatering primary, activated, digested or chemical sludge, write The Conkey Co., 420 Lexington Ave., New York 17, N. Y.

Fire Hydrants

405. Specifications for standard AWWA fire hydrants with helpful instructions for ordering, installing, repairing, lengthening and using. Issued by M & H Valve & Fittings Co., Anniston, Ala.

406. See listing No. 438.

407. Fire hydrants which are flood-proof, easy to operate and service are described in Rensselaer Bulletin W., formerly known as "Coreys." Address: Rensselaer Valve Co., Troy, N. Y.

408. For a concise description and illustrations of the Improved MUELLER-COLUMBIAN Fire Hydrants, complete parts list and full directions for ordering—get the new folder just issued by Mueller Co., Chattanooga 1, Tenn.

Flow Meters

409. The primary devices for flow measurement—the orifice, the pilot tube, the venturi meter and others—and the application to them of the Simplex meter are described in a useful 24-page booklet (42A). Simplex Valve and Meter Co., 6750 Upland St., Philadelphia 42, Pa.

Gas Holders and Digesters

411. Digesters and Gas Holders for efficient collection and storage of sewage gas are described in an interesting illustrated booklet issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago 4, Ill.

412. If your plans call for economical storage of digester gas, write for bulletin on Stacey Brothers All-Welded, High Pressure Spheres that combine safety with pleasing appearance. Stacey Brothers Gas Constr. Co., 5535 Vine St., Cincinnati 16, Ohio.

Gates, Valves, Hydrants

415. See listing No. 438.

416. Check valves of the Clear-Way, Quiet-Closing type which eliminate "Slam" are described in Rensselaer Bulletin V. Made in expanding outlet type, as well as straight-thru type, for bolting direct to pump discharge. Address: Rensselaer Valve Co., Troy, N. Y.

417. Rensselaer Gate Valves of high tensile strength, corrosion resistant iron are described in Rensselaer Bulletin X. Address Rensselaer Valve Co., Troy, N. Y.

418. A new four-page folder on MUELLER - COLUMBIAN Gate Valves gives construction details, shows various type of gear drive mechanism available, and has handy check list of dimensional data. Write Mueller Co., Chattanooga 1, Tenn.

419. Double-disc gate valves; hydraulically operated valves; air, check, flap and mud valves. Fire hydrants with sliding gate or balanced valve. A 32-page catalog. Ludlow Valve Mfg. Co., Inc., Troy, N. Y.

Gauges

421. The full line of Simplex gauges for filtration plants are illustrated and described in catalog issued by Simplex Valve and Meter Co., 6750 Upland St., Philadelphia 42, Pa.

Laboratory Equipment

423. pH and Chlorine Control. A discussion of pH control and description of comparators, chlorimeters and similar devices. An 80-page booklet. W. A. Taylor & Co., 7301 York Road, Baltimore 4, Md.

Manhole Covers and Inlets

429. Street, sewer and water castings in various styles, sizes and weights. Manhole covers, water meter covers, adjustable curb inlets, gutter crossing plates, valve and lamphole covers, ventilators, etc. Described in catalog issued by South Bend Foundry Co., Lafayette Boul. and Indiana Ave., South Bend 23, Ind.

Meters, Venturi

432. New bulletin illustrates Builders Air Relay system of transmission for the Venturi Meter which is particularly useful for liquids containing suspended solids like sewage. Eliminates corrosion, clogged pipes, etc. Write Builders-Providence, Inc., 9 Coddling St., Providence 1, R. I.

433. "The Selection of Main Line Meters," a highly informative and useful presentation prepared by a competent engineer, J. C. Thoresen, describes forms of differential producers and quickly solves typical problems with the use of graphic charts. Write Builders-Providence, Inc., 9 Coddling St., Providence 1, R. I.

Meters, Water

434. Six types of iron case cold water meters built for the duration, but to last for years are illustrated and described fully in folder issued by Pittsburgh Equitable Meter Co., 400 No. Lexington Ave., Pittsburgh 8, Pa.

435. "Watchdog" water meters, made in standard capacities from 20 GPM up; frost-proof or split case in household sizes. All parts interchangeable with present models of same manufacturer. For bulletins, write Worthington-Gamon Meter Co., 282-296 South St., Newark, N. J.

Pipe, Cast Iron

437. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super-deLavaud centrifugally-cast and pit-cast pipe. Bell-and-spigot, U. S. Joint, flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Burlington, N. J.

438. "Cast Iron Pipe and Fittings" is a well illustrated 44 page catalog giving full specifications for their complete line of Sand Spun Centrifugal Pipe, Fire Hydrants, Gate Valves, Special Castings, etc. Will be sent promptly by R. D. Wood Co., 400 Chestnut St., Philadelphia 5, Pa.

Pipe, Transite

442. Two new illustrated booklets, "Transite Pressure Pipe" and "Transite Sewer Pipe" deal with methods of cutting costs of installation and maintenance of pipe lines and summarize advantages resulting from use of Transite pipes. Sent promptly by Johns-Manville Corp., 22 East 40th St., New York 16, N. Y.

Pipe Joints, Water

443. Bellmaster Joints for simpler, faster, easier joining of cast iron pipe are illustrated in a new folder that gives full data on this self-contained mechanical joint. Write Dresser Mfg. Co., Bradford, Pa.

Pipe Joints Sewer

444. How to make a better sewer pipe joint of cement-tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston, Adams, Mass.

Pipe Joint Compounds

446. The uses of Tegul-Mineral lead for bell and spigot pipe and G-K Sewer joint compound are described in a 16-page illustrated booklet issued by Atlas Mineral Products Co., Merittown, Pa. Includes useful tables for estimating quantities needed.

Pumps, Sludge

447. Carter Sludge Pumps are described in 8-page illustrated bulletin, including specifications and tables. Address: Ralph B. Carter Co., Hackensack, N. J.

448. Non-clogging, vertical or horizontal, dry pit or submerged; storm water and drainage pumps are described in several Bulletins; also sump and bilge pumps. Dayton-Dowd Co., Quincy, Ill.

Pumps and Well Water Systems

449. Installation views and sectional scenes on Layne Vertical Centrifugal and Vertical Turbine Pumps fully illustrated and including useful engineering data section. Layne Shutter Screens for Gravel Wall Wells. Write for descriptive booklets. Advertising Dept., Layne & Bowler, Inc., Box 186, Hollywood Station, Memphis 8, Tenn.

450. Peerless pumps in a variety of types, with oil or water lubrication and any power drive, to pump water from any depth are described and illustrated in new literature that clearly shows their construction and special features. Write Peerless Pump Div., Food Machinery Corp., 301 W. Ave. at 26th St., Los Angeles 31, Calif.

451. Oil lubricated turbine pumps with open impellers. Five types of heads available. Specifications and illustrations in new bulletin 6930M-2 issued by Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill.

452. Centrifugal Pumps of various designs—single-stage, double-suction, split casing; single-stage single-suction; two-stage opposed impeller; three-stage; high-pressure; fire pumps; close-coupled. A bulletin for each type. Dayton-Dowd Co., Quincy, Ill.

Meter Setting and Testing

454. The most complete catalog we have seen on setting and testing equipment for water meters—exquisitely printed and illustrated 48-page booklet you should have a copy of. Ask Ford Meter Box Co., Wabash, Ind.

Screens

456. Be assured of uninterrupted, constant automatic removal of screenings. Folder 1587 tells how. Gives some of the outstanding advantages of "Straightline Bar Screens" (Vertical and Inclined types). Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

Sludge Drying and Incineration

458. "Disposal of Municipal Refuse." Complete specifications and description including suggested form of proposal; form of guarantees; statements and approval sheet for comparing bids with diagrammatic outline of various plant designs. 48 pages. Address: Morse Boulder Destructor Co., 206-P East 42nd St., New York 17, N. Y.

459. Recuperator tubes made from Silicon Carbide and "Fireclay" Corebustors for maximum efficiency are described and illustrated in bulletin No. 11 issued by Fitch Recuperator Co., Plainfield National Bank Bldg., Plainfield, N. J.

460. Nichols Herreshoff incinerator for complete disposal of sewage solids and industrial wastes—a new booklet illustrates and explains how this Nichols incinerator works. Pictures recent installations. Write Nichols Engineering and Research Corp., 60 Wall Tower, New York 5, N. Y.

Softening

462. This folder explains the process of Zeolite water softening and describes and illustrates the full line of equipment for that purpose made by the Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago 4, Ill. Includes flow charts, tables and other valuable data. Write for a copy of this instructive folder.

Sprinkling Filters

466. Design data on sprinkling filters of Separate Nozzle Field and Common Nozzle Field design as well as complete data on single and twin dosing tanks, and the various siphons used in them, for apportioning sewage to nozzles. Many time-saving charts and tables. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

Stand-by Motors

467. Buffalo stand-by motors for generators or pumping units are covered in illustrated specification sheets sent promptly by Buffalo Gasolene Motor Co., Dept. F.W., Buffalo 3, N. Y.

Swimming Pools

468. Data and complete information on swimming pool filters and recirculation plants; also on water filters and filtration equipment. For data prices, plans, etc., write Roberts Filter Mfg. Co., 640 Columbia Ave., Darby, Pa.

Taste and Odor Control

470. "Taste and Odor Control in Water Purification" is an excellent 92-page, illustrated booklet covering sources of taste and odor pollution in water supplies and outlining the various methods of treatment now in use. Every water works department should have a copy. Write Industrial Chemical Sales Div., 230 Park Ave., New York 17, N. Y.

471. Technical pub. No. 207 issued by Wallace & Tiernan Co., Inc., Newark 1, N. J., describes in detail taste and odor control of water with BREAK-POINT Chlorination, a method of discovering the point at which many causes of taste may be removed by chlorination with little or no increase in residual chlorine. Sent free to any operator requesting it.

Treatment

475. Three types of clarifiers for sewage treatment are illustrated and described in a new bulletin issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago 4, Ill.

476. "Safe Sanitation for a Nation," an interesting booklet containing thumbnail descriptions of the different pieces of P.F.T. equipment for sewage treatment. Includes photos of various installations and complete list of literature available from this company. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

477. All-steel Rotary Distributors, correctly designed for the small and medium sized sewage plants, are the subject of a new, well illustrated booklet issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago 4, Ill. This booklet also covers distributors for various types of high-rate trickling filters.

478. New booklet (No. 1642 on Link-Belt Circuline Collectors for Settling Tanks contains excellent pictures; drawings of installations, sanitary engineering data and design details. Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

479. New 16-page illustrated catalog No. 1742 on Straightline Collectors for the efficient, continuous removal of sludge from rectangular tanks at sewerage and water plants. Contains layout drawings, installation pictures and capacity tables. Address Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia 40, Pa.

480. New illustrated folder (1942) on Straightline apparatus for the removal and washing of grit and detritus from rectangular grit chambers. Address: Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

483. A combination mechanical clarifier and mechanical digester. The Dorr Clarigester is explained and illustrated in a bulletin issued by The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

484. Preflocculation without chemicals with the Dorrco Clariflocculator in a single structure is the subject of a new booklet issued by The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

485. Dorrco Monorake for existing rectangular sedimentation tanks, open or closed, is described and illustrated in a new catalog sent on request. The Dorr Co., 570 Lexington Ave., New York 22, N. Y.

488. "Packaged" Sewage Treatment Plants, specifically developed for small communities—100 to 3,000 population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., 2433 Wolfram St., Chicago 18, Ill.

489. "Carter Controlled Flocculation" is title of illustrated folder available on request from Ralph B. Carter Co., Hackensack, N. J.

Underdrains, Trickling Filter

492. Illustrated bulletin describes the Natco Unfilter block of glazed, hard burned clay for underdraining filter beds. Write National Fireproofing Corp., Pittsburgh 12, Pa., for free copy.

493. Full details about Armere Filter Bottom Blocks for Trickling filter floors, includes drawings illustrating construction details. Complete bulletin available from The Bowerston Shale Co., Bowerston, Ohio.

Valves (See Gates, Air Release, etc.)

Water Treatment

494. New special folders contain the latest information in High Test Calcium Hypochlorite, Caustic Soda, Soda Ash, or Chloride of Lime as manufactured by Hood Chemical Co., 1819 Broadway, New York 23. Write for desired folders, or use coupon in this section.

495. If you have a water conditioning problem of any kind, write Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago 4, Ill., who manufacture all types of conditioning equipment and will be pleased to make recommendations.

496. "Use of copper sulphate in water treatment plants" titles informative booklet, with valuable data on chemicals, dosage, etc. Write Tennessee Corporation, Atlanta 1, Ga.

497. Ferri-floc Ferric Sulphate—a new, valuable booklet on coagulation for water and sewage treatment plants. Write Tennessee Corporation, Atlanta 1, Ga.

Water Service Devices

500. Data on anti-freeze outdoor drinking fountains, hydrants, street washers, etc., will be sent promptly on request to Murdock Mfg. & Supply Co., 426 Plum St., Cincinnati 2, Ohio.

Keep 'em Looking Like New All the Time

One coat of Green Paint makes MURDOCK Outdoor Water Devices look like new. Paint them at least once a year. (Polish bowls of Drinking Fountains.)

And here you have Reason No. 1 why "It pays to buy MURDOCK."

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MURDOCK



STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933.

OF PUBLIC WORKS, published monthly at New York, for October 1, 1944.
State of New York }
County of New York } ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Croxton Morris, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the PUBLIC WORKS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Public Works Journal Corp., 310 East 45th St., New York 17, N. Y.; editor, A. Prescott Folwell, 310 East 45th St., New York 17, N. Y.; managing editor, none; business manager, Croxton Morris, 310 East 45th St., New York 17, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Public Works Journal Corp., J. T. Morris, Croxton Morris, A. Prescott Folwell and Anna Morris, all of 310 East 45th St., New York 17, N. Y.; W. A. Hardenbergh, Washington, D. C.; Wesley Hardenbergh, Golf, Ill., and Sumner N. Hume, address unknown.

3. That the known bondholders, mortgages, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) Bertha Morris, White Plains, N. Y.; Mary Sunderland, Liberty, N. Y., and Alberta S. Hardenbergh, Ridgewood, N. Y.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months

Dresser Industries Is New Name for Dresser Manufacturing Co.

At a special meeting of the shareholders the name of Dresser Manufacturing Co. was changed to Dresser Industries, Inc., H. N. Mallon, president, announced. Dresser Industries, Inc., comprises a number of related companies producing equipment for the water works, oil and gas fields.

"The enterprise can no longer go under the name of a single manufacturing company because it has, in fact, become a group of related industries," Mr. Mallon said. At the same meeting Dresser stockholders approved an increase in authorized capitalization from 350,000 to 600,000 shares.

The increased capitalization provided shares for the consummation of an agreement between Dresser Industries, Inc., and International-Stacey Corp. Effective Nov. 1, Dresser will acquire the properties of International-Stacey in consideration of the issuance of 103,000 shares of Dresser stock to International-Stacey shareholders.

Also voted at the special meeting was a change in Dresser stock from no par value to a par value of \$1 per share.

Public Works Engineer Available

Eighteen years' experience including Highways, Water Supply, Sewerage, Sewage Disposal, Refuse Collection and Disposal. Associate member A.S.C.E. Member American Public Works Ass'n, Rocky Mountain Sewage Works Ass'n. Age 41, married, one child. Wants job as engineer for progressive city or town or, assistant engineer where promotion on proven ability is possible. Robert C. Ratcliffe, 816 Iverson Avenue, Laramie, Wyoming.

Highway Research Board Meeting Postponed

The Executive Committee of the Highway Research Board announces that owing to the exigencies due to the War it has been decided to postpone the Twenty-Fourth Annual Meeting of the Board which had been scheduled to be held on November 22 to 25 at the Netherland Plaza Hotel in Cincinnati, Ohio.

New Officials for Beaumont Birch Co.

Raymond A. White, Jr., newly appointed president of the Beaumont Birch Company, Philadelphia, has announced the election of company officials. George T. Birch will continue as Vice-President and Treasurer, in addition to acting as Chairman of the Board. Mrs. Florence L. Birch will act as Secretary. William G. Davenport has been made Vice President in charge of sales. An enlargement of sales activities will follow.

preceding the date shown above is
(This information is required from daily publications only.)

CROXTON MORRIS, Business Manager.
Sworn to and subscribed before me this 27th day of Sept., 1944.

[Seal]

My commission expires March 30, 1945.

GEORGE IRVINE

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